

**FORMING A COMPLETE RECORD OF THE PROCEEDINGS OF ALL PUBLIC COMPANIES.**

[PRICE 6D.]

The expense of excavation per yard forward of the sectional area of any cutting will consequently be  $p + p \left(1 + \frac{a}{b}\right) x$ ; and, when this price exceeds the price per lineal yard forward of tunnelling, the latter is cheaper, supposing the given prices to cover all risk and contingencies in each case. But, as circumstances are continually varying, the English engineers so repeatedly state that he has to modify—and, perhaps, finally abandon—the general theoretical rule, and fall back on his own experience, and that of the contractor he may be disposed to employ, that, although he may occasionally resort to such a formula as an approximation, he tends to modify it in practice, and obtains the sectional area of the given cutting in superficial yards, by simple mensuration, and multiplies it by the price. All the complex conditions, involved by slips, faults, water, and the numerous incidental occurrences in great works, to occasion unforeseen expenses, render prices uncertain, and prevent any fixed general rule; and it is only when the materials and probable contingencies are perfectly well known, that the element of cost can be safely introduced into the mathematical formula. For dry indurated sands, gravel, sandstone-rocks, &c., calculations may be made within probable limits of error; whereas, in any instances where the theoretical rule and general opinion, even of those sufficiently experienced, would recommend tunnelling, it has been tried in vain, abandoned after great expense in contending with water, and resources had after all to open cutting. The average cost of tunnelling upon the principal railway lines, as actually executed, appears to be about 30*l.* per yard forward—in some instances as much as 100*l.*, especially when driven forward in rocklike strata, and in attempting to sink shafts, or drive drifts, without due consideration as to the quantity of water in the various strata, or the means of at once grappling with the difficulties of drainage or pumping. With great facilities, favourable material, and not too much burying, the same area of tunnel has been driven for as little as 10*l.* per yard forward. In sound sandstone, and on an average, the sectional area of the ordinary tunnel, for a double line of railway, to be worked by locomotive engines, may be called fifty superficial yards when finished, or within the ring of brickwork or masonry, if lining were required; in this latter case, the sectional area of the opening to be excavated may be assumed as about eighty superficial yards. Mr. Vignoles observed that, for future tunnel operations, with the benefit of past errors and experience, by avoiding water shafts in excavation, and with efficient action and activity, 40*l.*, or 50*l.*, per yard forward for tunnelling, may be taken as an average approximate fair price. Now, if it was wished to compare this expense of tunnelling with the cost of open cutting, the evidence observed that, from his experience, which had been very considerable, in excavating strata in large quantities, he was not disposed to put this price less than that of 1*l.* per cubic yard for removing material for deep



## LAW INTELLIGENCE.

## LIABILITY OF SHAREHOLDERS—IMPORTANT CASE.

COURT OF COMMON PLEAS—JUNE 11.

observations, especially when this price is to cover contingencies of slips, &c.; with such a price, then, an open cutting, fifty-five feet deep, roadway twenty-four feet wide, and soil requiring slopes of two horizontal to one perpendicular, would give a sectional area of 800 yards—that is, the expense (in estimate) would be the same as that of tunnelling. But Mr. Vignoles observed, that, in addition, the future maintenance of the tunnel should be taken into consideration, as well as whether the material from the cutting could be disposed of with advantage; the nature of the soil, and a variety of other circumstances, which he stated, all of which would influence the decision. In soft rock, which would work with facility, and yet stand nearly perpendicular, the depth might be very much greater than fifty-five feet before tunnelling would be cheaper. In such cases, a depth of eighty feet and upwards had been resorted to. In chalk, the proper slope to be given, which was very variable, would greatly alter any elements of calculation, while, on the other hand, in forming tunnels through chalk, experience had shown that water was the great enemy, and had entailed enormous expenses. The Professor went into a great many other points for comparing excavations with tunnelling, but they appeared too technical to be satisfactorily explained in a brief abstract such as this. Mr. Vignoles next proceeded to the consideration of viaducts and aqueducts, into which, he observed, a totally different set of conditions enter, the cost varying from 20l. per lineal yard to the price for which no rule could possibly be laid down. Viaducts such as that of which the London and Greenwich Railway wholly consists, may, probably, be accounted for 20l. to 30l. per yard, including the foundations. Of course, the foundation entered materially into the calculation, and where water had to be crossed largely increased the expense. In some peculiar instances, a large river viaduct, or bridge, has cost as much as 200l. per lineal yard. The Professor instanced a viaduct he had built over the river Ribbles, at Preston, for the North Union Railway. The length was 300 yards, the height about forty-five feet above the water, and the whole mass, including concrete foundations (where the rock was not attained), comprised about 25,000 cubic yards; coffer-dams were used for the piers, and for one abutment. The bridge consisted of five arches, each of 120 feet span, battering on the face and spandrels from the parapet to the impost course—roadway about twenty-seven feet wide; the total cost, including all contingencies, was 45,000l., which is 150l. per yard forward, or 50s. per cubic yard on the whole solid contents; this might be considered a low price, inasmuch as an ordinary brick bridge, of twenty to thirty feet span only, and with facilities for construction, can seldom be built for less than 20s. per cubic yard. Where no water or expensive foundations are to be encountered, and where the spans of the brick or stone arches do not exceed about sixty or seventy feet, 1s. per cubic foot on the solid contents of the viaducts may be put as a good covering price. Mr. Vignoles stated that, for such viaducts, about 60l. to 70l. per lineal yard might probably be taken as the average approximate cost, and the additional expense, from a considerable increase of height, does not become so very great, as it chiefly affects the piers only. The Professor then enlarged much on adopting timber arches, with piers of masonry, for viaducts of large span and great height, and produced a number of drawings of such bridges, some actually constructed, and some only proposed. The heights were from 70 to 130 feet, the minimum price being 35l., and the maximum 80l. per lineal yard. He further pointed out that high embankments should be avoided, and timber viaducts substituted, as a more point of economy, even without taking into consideration the risk and danger of slipping in such great masses of earth. In an embankment only forty feet high, an occupation bridge for a farm would often cost nearly 1000l.; it was, therefore, only in crossing a very narrow valley or ravine, where no bridges under would be called for, and no masonry—except, perhaps, a culvert of the very smallest dimensions—that very high embankments should be made. Mr. Vignoles alluded to several such, varying from twenty to ninety feet high, which he had made, and pointed out a terrible failure in one case, although in other instances success had followed. In passing through hilly countries, and along mountain sides, torn by ravines, the introduction of the timber-tup viaduct, with stone piers, to overcome points of great but partial difficulty, was strongly recommended, especially at great additional height of viaduct could be given at small expense, and thus excavations on each side saved. We have been able to give but a very brief outline of this lecture, which, from the numerous illustrations and drawings of viaducts, tunnels, &c., exhibited, was extremely interesting, and in the course whereof many curious and valuable statements in respect of these great works of art were introduced.

(To be continued in our next.)

**CONTINENTAL RAILROADS.**—We are informed, on unquestionable authority, that a banker at Genoa has invested the sum of 800,000l. in the railroad about being constructed in that part of Italy. This real friend to his country, in thus advancing the construction of railroads, it is said, has determined on not parting with a single share until the whole of the lines shall have been completed.

**EXTRAORDINARY DISCOVERY.**—At the meeting of the Royal Geographical Society, on Monday last, R. I. Murchison, Esq., V.P., stated some interesting facts on a subject which will probably soon be brought before the notice of the society; it was, that a gentleman, employed by Government, had, in ascending the river Juba, in Africa, from east to west, fallen in with a considerable tract of country inhabited by a curious race of pygmies, not exceeding four feet in height, with very strange views of religion and government; and exactly resembling the type of Hærodotus, which singularly confirmed some opinions on the subject recently brought before the notice of the Anthropological Society.

**EARTHQUAKE IN ST. DOMINGO.**—We regret to announce the appalling intelligence that 10,000 people have been swallowed up by an earthquake at and near Cape Haytien, St. Domingo. The following summary of the range and extent of this destructive event, taken from the *New York Herald*, of the 20th ult., is, we are informed, as correct an account as can be present be ascertained.—"The earthquake which has recently devastated a large portion of St. Domingo was one of the most severe that has occurred in any part of the world for many years; and perhaps more extensive in the sphere of its operations than any since the earthquake which destroyed Lisbon in 1755. It appears that on the same day, and very nearly the same hour, the effects of this recent earthquake were felt in various places, ranging from Port-au-Prince to the base of the Rocky Mountains. The greatest explosion from the force of internal put-up fires was felt at Cape Haytien, St. Domingo, on the 7th of May. Here they had three consecutive and violent shocks; and, previous to the first of these, a shock of the earthquake was felt at Forto Rico, on the morning of the 7th of May, which, as far as we have yet learned, was the most westerly point that the effects of it were felt. The internal fires, it seems, then took a north-westerly direction, struggling to escape from their prison-house, and ultimately tore the ground asunder and broke out at Cape Haytien. It stretched clear across the breadth of St. Domingo, and was felt at Port-au-Prince on the same day, and at nearly the same hour. It also travelled on and was felt at Mayaguez at the same time; then to St. Martinville, and was in two other places in Louisiana; thence to Van Buren, Arkansas, and clear up to foot of the Rocky Mountains, where it was also felt on the same day. It thus travelled at least 1200 miles, and perhaps was felt even further. It is a sublime and awful thought. Here we have proof of the existence of a body of internal fire 1200 miles long, and probably as many deep."

**GALVANIC GLASS.**—The new method of glazing by means of galvanism appears to have excited considerable interest in Germany. There is in the *Zeitschrift der D.M.G.*, of the 5th inst., an article which states that Prof. Dingler, of Frankfurt, has, after long perseverance in experiments, brought the process to the highest degree of perfection. He has discovered a salt, the application of which to the material, it is said, overcomes all the difficulties hitherto encountered in glazing. All kinds of metals, on being immersed in the solution of this salt, come out brilliantly glazed, without suffering any of those black marks or stains to which they would be liable in the common process.

**UNDESIRABLE SUCCESSION OF GROUND SUBSIDENCE.**—Many schemes, attributed to Vignoles, directed at victory, and determined against as impracticable, will be realized the moment the search of sound knowledge has affected this the one question—that of making man wise enough to use these true treasures, and determined enough to possess them.—*Edw. F. Wood: Address to Pattern Shareholders.*

**WIND FANES.**—It has been at length determined to pave Obediah Smith with wind, and the weary are now laying their heads together to finish the animal.—*Punch.*

**HARRISON G. HEATHORN.**—This action was brought against the defendants as shareholders of the Anglo-American Gold Mining Association, to recover the amount of certain bills of exchange drawn by one Penman on Blundell, one of the directors of the company, and taken up by the plaintiffs for the honor of the drawer. The deed of settlement by which the company was constituted was executed on the 1st of November, 1833, by Messrs. Tate, Penman, and seven other persons, but the defendant Heathorn was not one of them. The capital of the company then consisted of fifty shares of 100l. each, and Penman went out to the United States as the company's superintendent, with liberty to draw on the treasury, in order to carry out the objects of the company. The mines, however, did not turn out to be so productive as the shareholders had anticipated, and in the meanwhile Penman had drawn bills on Blundell to a very large amount. A special meeting of the association was accordingly convened on the 17th of December, 1833, and that meeting the defendant Heathorn attended, and his name was taken down by the solicitor of the company as the proprietor of one share. The meeting, which was attended by five persons, agreed to a resolution empowering the directors to sell certain property belonging to the company if they could, and if they could not do so within one week, then they were to be at liberty to raise 10,000l. by issuing 100 additional shares of 100l. each, and with the money thus procured they were directed to take up the bills which Penman had drawn on Blundell. Being unable to dispose of the property indicated by the resolution, the directors issued additional shares, and invited the plaintiffs to become partners in the concern. The plaintiffs, however, learning that disputes had arisen between the directors and Penman, declined the proposal, but an agreement was entered into between them and the directors on the 24th of December, 1833, by which it was arranged that the plaintiffs should take up certain bills which had been drawn by Penman on the company, the amount not to exceed 6000l., and that they should be at liberty to take sixty shares at par, provided they made their option by a given period. When the period for their election arrived they determined not to take the shares, and the company negotiating to repay them the advances which they had made to cover the bills drawn by Penman, they had brought the present action against the defendants. The case was tried before Lord Chief Justice Tindal, at the Guildhall sittings after last Michaelmas term, and a report of the case appeared in the *Mining Journal* of the 19th of December. The only evidence against Heathorn was, that he had been present at the meeting of the 17th of December, 1833. Upon the suggestion of the learned Chief Justice a verdict was taken for the plaintiffs, subject to the opinion of the Court, with liberty to the Court to draw such inferences as a jury might make, and rules having been obtained in Hilary term on the part of three of the defendants to enter the verdict for the defendants generally.

Sir T. WILKE (with whom were Mr. W. H. Watson and Mr. M. Smith) showed cause to-day against the rules, and contended, in the first place, that there was sufficient *prima facie* evidence of partnership to induce their lordships to arrive at the conclusion that Heathorn was a shareholder in the concern, as it was not to be supposed that he would have been allowed to be present at the meeting of the 17th of December, 1833, unless he had been a proprietor, since none but proprietors could attend, even as proxies for other shareholders, with the special exception of Penman's proxy, who, however, was not present. Secondly, the company was not, as had been urged at the trial, an illegal one, and a common nuisance, notwithstanding the opinion expressed by the Vice-Chancellor of England in "*Blundell v. Winsor*," 8 Sim. 601. This was not the case of a company, without capital, endeavoring to deceive the public by publishing a flourishing prospectus and holding out to the unwary the delusive promise of enormous profits, in order that the directors might make money for themselves by jobbing in shares. The company was formed by ten individuals, and the whole of the sixty shares were divided among them with the *bona fide* intention of obtaining gold ore and smelting it. There was nothing mischievous or injurious to the Queen's subjects in prosecuting such an object as this. Admitting that the shares of the company were made transferable without any other restriction than the payment of the money due on them, it did not follow that the shareholders thereby assumed to act as a corporation. The provisions of the Bubble Act were out of the question, that act having been repealed, and to make such a company illegal it must be shown to be a nuisance at common law. The certificate of discharge, that a party had ceased to be a shareholder in the company, and that he was released from all future liability in respect of his shares, did not imply that he was no longer responsible to the public in respect of past contracts, but merely that his late partners had no further claim against him. There was no stipulation either in the deed that upon a transfer of shares the transferee should be placed in the same position as to rights and liabilities as the assignor, but such a contract was to be left to the legal consequences which resulted from it. The judgment on this point in "*Devergie v. Fellows*," 5 Bing. 340, upon which the Vice-Chancellor of England founded his own judgment in "*Blundell v. Winsor*," was not necessary to the decision, as it was admitted on the pleadings that the shareholders in that case intended to act as a corporation. In the present case that fact was expressly denied. Thirdly, as the money borrowed by the directors was taken up on the credit of the firm for the purposes of the partnership, the directors had authority to bind Heathorn by the agreement of the 24th of December, 1833. Upon these grounds it was submitted that the rules ought to be discharged.

On the part of the defendants Heathorn, Tate, and Messitt, who were respectively represented by the Solicitor General (with whom was Mr. R. V. Richards and Mr. J. L. A. Lopham), Mr. Kelly (with whom was Mr. Crompton), and Mr. Serjeant Bompas, it was maintained that as the shares in the company were made transferable at the option of the holder, the trading of such a company was illegal. There might be a hundred changes among the members of such a partnership in the course of an hour, and such proceedings were highly inconvenient and mischievous to the public. The directors were empowered to multiply the shares at pleasure, and 142 additional shares had actually been issued. The company had been guilty of a deception on the public, who would be induced to suppose that after the assignment of their shares their property would be no longer liable to the debts of the company. The company was therefore an illegal one at common law, upon the ground that they had acted as a corporation without the authority of an Act of Parliament or a Royal charter. The plaintiffs were acquainted with the nature of the constitution of the company, and, having with this knowledge furnished money for the purposes of the partnership, they could not now recover. It was argued also that there ought to be direct and satisfactory evidence of partnership, and that the directors had no authority to bind Heathorn, even if he could be taken to be a partner. The only authority which the directors could exercise was derived from the deed of settlement, and the provisions of the deed had not been complied with, inasmuch as notice of the meeting of the 17th of December, 1833, had not been given, nor of the purpose for which the meeting was convened.

Lord Chief Justice Tindal said that the Court would take time to consider the case, and desired to be furnished with a copy of the pleadings and the deed of settlement, and the other documents referred to in the course of the argument.

## MANUFACTURE OF IRON—MR. CRANE'S PATENT.

COURT OF COMMON PLEAS—JUNE 13.

**CRANE'S PATENT AND OTHERS.**—This was an action on the case for the infringement of a patent granted to the plaintiff in 1836, for an improvement in the manufacture of iron, the improved process consisting in the use of an atmosphere, or steam, or gas, for the purpose of smelting iron, such fuel being made combustible as a combustible material by the application of a hot air blast, heated to 600 degrees of Fahrenheit. At the trial before the Lord Chief Justice a verdict was entered for the plaintiff on all the issues, subject to the opinion of the Court, with liberty to the Court to draw the same inferences which a jury might make. The case was argued in Hilary Term, and the Court now said that the main question in the case turned on the third issue, which involved the question whether the invention of the plaintiff was a new invention within the statute of James, or, in other words, whether the invention was the subject of a patent. The plaintiff had described the object of his invention to be the application of an atmosphere, or steam, or gas, for the purpose of smelting iron from ironstone, combined with the use of a hot air blast, and he had stated that he did not claim the use of a hot air blast separately, when combined with the use of an atmosphere, or steam, or gas, or the use of the atmosphere without the hot air blast. The question, therefore, was, whether the combination of the hot air blast and the atmosphere was a subject matter for a patent, and the Court was of opinion, that if the result of such a combination was, either to make a new, or a cheaper, or a better article, the invention might well become the subject of a patent. Patents had been held to be good in similar cases. In Hall's patent the invention consisted in applying the flame of gas to smelt the superphosphate of lime, and in that case the flame of an oil lamp had been previously used for the same purpose. Daniell's patent, mentioned in *Clutton v. Brough*, was for an improvement in drawing molten metal, where the invention consisted merely in immersing a roll of cloth, manufactured in the usual manner, in hot water. There was no doubt in the present case that iron manufactured in the usual manner was a better quality, and made at a less expense than iron, smelted by the use of a hot blast of air applied to ironstone ore. No witness had been produced on the part of the defendants to show that the plaintiff had not the invention of the combination to which he had laid claim, and upon these considerations the Court was of opinion that the verdict should be entered for the plaintiff on the third issue. They thought also that the verdict ought to be entered for the plaintiff upon the other issues, with the exception of the fifth, and the Court considered that they ought to be entered for the defendants, since it was impossible to say that the plaintiff did not claim a right to the use of Niagara's

patent for a hot air blast, and the evidence showed that he had taken out a license from Niagara to use it. The question then arose, whether the plaintiff was entitled to have judgment entered for him upon this issue, notwithstanding the verdict; and as there was an express disclaimer in the specification of the use of the hot air blast as covered by Niagara's patent, and that invention was stated to be known to the public, and to be applied by the plaintiff to something else, the judgment must be entered for the plaintiff upon the fifth issue, notwithstanding the verdict, the refusal by Niagara of a license being a possibility so extremely remote, that it could not form any legal ground for objection.

## MONMOUTHSHIRE IRON AND COAL COMPANY.

VICE-CHANCELLOR'S COURT—JUNE 13.

**MR. S. SHARP** moved for the production of certain papers mentioned in the defendant's answer. The plaintiffs, Messrs. Wyld and Parton, held a bond for securing a debt, and had filed a bill, by which they insisted that the debt was due from the Monmouthshire Iron and Coal Company, and for which they claimed a lien on their property. The defendant was secretary to the company, which had been constituted by Act of Parliament, and was empowered to sue and be sued by their secretary. The defendant alleged that the papers specified were not in his individual custody, nor under his control, although, as secretary, and by permission of the company, he had the care of them.—No one appearing to oppose the motion.

His HONOR thought the meaning of the expression, that "the company should sue and be sued by their secretary," was well understood, as importing that it was to be taken in law as the corporate name of the company, subject to anything that might be said by way of explanation.—Motion granted.

## LAW OF PARTNERSHIP—WESTERN MINING ASSOCIATION.

**FOX V. FRITH AND OTHERS.**—At the assizes for this county, held at Bodmin in March last, this cause was tried before Mr. Justice Erskine and a special jury. It was an action on a promissory note for 1300l., brought by Joshua Fox, Esq., of Tragedia Cottage, near Falmouth, against Messrs. Frith, Barrett, Aggs, Cash, and Sterry, the directors of the Western Mining Association. It appeared that Mr. Fox, having for some time worked a mine at Penzance, near his residence, entered into an arrangement with the defendants, by which he disposed of part of his interest in the mine to them, consenting to take, in addition to a certain sum of money, 200 shares in the Western Mining Association; and, upon the faith of this arrangement, he had received bills or notes, one of which was the subject of this action. This note having been at a long date, the defendants worked the mine for some months unsuccessfully, and ceased working prior to the note becoming due, and on its presentation at maturity, payment was refused. This action having been commenced, defendants pleaded that the note in question had been obtained by fraud, because, as they alleged, the plaintiff had represented the mine to be a very rich one, whereas it turned out to be otherwise. They also pleaded that plaintiff had entered into partnership with defendants in the Western Mining Association, and, therefore, could not maintain his action. After hearing the evidence, the jury returned a verdict for the plaintiff for the full amount claimed—subject to the point of law as to the alleged partnership, which the judge reserved for the decision of the court above.

In the Court of Exchequer, on Tuesday, the 24th inst., present the Lord Chief Baron Alderson, and Barons Gurney, Alderson, and Keble. The point reserved was discussed and determined.—Mr. Baron Gurney began by reading Mr. Justice Erskine's notes of the trial, but was stopped by one of the counsel, who explained to his lordship that the notes he was reading related to the plea decided at the trial, and that the question now to be determined was the plea of partnership.

Mr. ERSKINE (for the plaintiff), referring to a copy of the Deed of Partnership of the Western Mining Association, directed the attention of the court to various clauses, and contended that the mere holding of scrip certificates was not to be considered as entitling the holders to be shareholders or partners, and also that even if the plaintiff were a shareholder, the persons who had signed the note of hand would still be liable, they having done so as individuals, and not as directors of the company.—Mr. BURY followed on the same side, and was arguing the latter point, when one of the judges observed, that he was treating it too much as a doubtful question, in which light the court did not regard it.

Mr. CROWE and Mr. SMITH (for the defendants) contended, at much length, that the holders of scrip certificates, being entitled to profits and to a participation in any surplus that might remain in the event of the concern being wound up, were partners. Lord ALDERSON said, he could not but admire the ingenuity of the learned counsel, who had spent an hour and a half in arguing this question in support of the plea, their labours, however, had given no support to their case, for all they had succeeded in establishing was that the possession of scrip certificates placed it in the power of the plaintiff to become a partner, if he had chosen to have done so; but as to the certificates themselves, he might have thrown them into the fire at any time, and so have got rid of all responsibility connected with them. Those documents (continued his lordship) constituted only a sort of inchoate partnership, which might have been confirmed and completed by signing the deed, but was not perfect until then. This doctrine he held, notwithstanding that the right to participate in profits had been dwelt on in the deed. With regard to the argument for a partnership founded on the agreement of the plaintiff to take 200 shares, or scrip, which agreement was annexed to the note of hand, that agreement was made, at all events, when a partnership could not have existed, and nothing more could have been intended than that plaintiff was to receive the 1800l. in money, and also 200 scrip certificates—not that he was to have the 200 certificates and 1800l. afterwards, if he could get it by a suit in Chancery. After some remarks on the conduct of the defendants in this case, his lordship concluded by saying:—"My opinion is that the plea is bad."—"I am of the same opinion," said Mr. Baron Gurney.—"And so am I," said Mr. Baron Alderson.—"I may add, that it is my conviction that even had Mr. Fox signed the Deed of Settlement, it would not have exonerated the directors from their liability on the note of hand." Mr. Baron Alderson had left the court before the counsel had concluded their arguments.—*Penance Gazette.*

[This decision gives Mr. Fox the full benefit of the verdict at the trial. Previous to the trial at Bodmin, we understood that the defendants applied to the Court of Chancery for an injunction to restrain the plaintiff from going to trial in this county, but the injunction was too late, and defendants then applied for an injunction to stay judgment, which will now, no doubt, be dissolved. The decision and unanimous opinion of the Court of Exchequer affords but little encouragement for further litigation by the defendants.]

## QUESTION OF PATENT RIGHT.

COURT OF QUEEN'S BENCH—JUNE 16.

**THE QUEEN V. JAMES WALTON.**—This was a *scire facis* to repeal a patent which had been taken out by the defendant in the year 1824, for the application of a fabric of cloth and India rubber to the purpose of forming the backs of cards for carding wool or cotton. The allegation in support of the prosecution was, that the invention was not new, for that, in the year 1824 and 1825, Mr. Hancock had applied the union of cloth and India rubber to various purposes, and that Mr. Macintosh, believing that what Mr. Hancock was then doing was an infraction of the rights which he (Mr. Macintosh) had acquired from his discoveries as to the means of uniting cloth and India rubber, to form a fabric impervious to water, interfered with the matter, and the dispute was arranged by agreement between them.—Mr. Hancock claiming Mr. Macintosh's license to deal with the invention as his own. Mr. Hancock, it was alleged, then considered how he could apply this invention to other new and useful purposes, and, among other things, he thought of using it in the manufacture of carding tools, and in 1826 he had so fully succeeded in this object, that Mr. Faraday, in the course of a lecture delivered on the subject at the Royal Society, expressly mentioned that cards for woolen and cotton carding had been so manufactured by Mr. Hancock. This lecture was afterwards printed in the *Journal of Science and the Arts*, in 1826, and the carding instruments so made had been so manufactured in that way from that time to the present. This was the substance of the case on the part of the prosecution, to which the answer was, that the style of the manufacture and the proportions of the fabric employed by Mr. Hancock and Mr. Walton were totally different—that the fabric formed was in some respects different; and that the matter for which the plaintiff had obtained his patent was, therefore, in every respect, a new invention.

The case occupied the court until a late hour, when the further hearing of it was adjourned.—The arguments were continued during the whole of yesterday (Friday), and were not concluded at its rising.

## MINE ACCIDENTS.

**For Conals Mine.**—A melancholy and fatal accident occurred at this mine about a fortnight ago, from a portion of ground falling away, by which Thomas Howard, who was working near, suffered a broken leg, with a severe cut and dislocated ankle. He was carried home, and after lingering near a fortnight, died from the injuries received.

**Elmore Pit, Durham.**—An explosion of fire-damp took place in Elmore Pit, on the morning of Tuesday last, when seven men were severely hurt, two of whom are not expected to recover.

**Stephenson's Quarry, near Bolton.**—A few days since A. Flint, a workman employed in getting stone in the quarry, fell from the summit of the rock, and was seriously injured.—A similar accident befell two other labourers, about three weeks since, who have not yet sufficiently recovered to return to their work.

**Major, Flapton.**—On Monday week, at T. Warren, of Clumber, was engaged in a quarry near Major, a scale fell, and buried him. He contrived, however, to extricate himself, and crawl to the top of the quarry, where he was found, but so badly injured he could be removed.

**Walsley and Elmore Coal Company.**—On Wednesday week the coal about the points in the pit belonging to this company ignited, which caused it to send forth an immense volume of smoke, and it was at first thought that the head gear, &c., would be destroyed; prompt means were adopted to stop any draught, and by the painstaking exertions of the workmen and others who kindly gave their assistance, no particular damage was done to the machinery, head gear, &c.; there was no work in the pit at the time, having left their work owing to a slight repair the engine was undergoing. This it will be the first untoward circumstance that has occurred at this colliery since the works began in January, 1851, and it was intended to commence delivering coal immediately, but as the pits are now smothered up some little delay must necessarily ensue.

**Brown's Black-Box Colliery, Walsleyhampton.**—On Saturday last a young man, named T. Prosser, went with his horse and cart to this colliery, and while waiting for his cart to be loaded he sat down by the pit-edge in the bottom of the shaft, with the intention of seeing the engine work. He had not been down five minutes before a large stone, from the roof of one of the upper shafts, fell upon him, crushing him in its descent, so that he was instantly killed. The stone is supposed to be three tons weight. Two other men were hurt, but not seriously. *Edw.*



## LECTURES ON GEOLOGY.

WITH THEORETICAL INFERENCES AND PRACTICAL APPLICATIONS.  
BY PROF. J. PHILLIPS, F.R.S., &c.

LECTURE 3.—Professor Phillips, in commencing this lecture, which was devoted to the consideration of the nature and affinities of fossil plants, said, that the consideration of the inorganic portions of ancient Nature showed the existence of two great causes of change—the action of heat and the action of water. And, in reference to this inquiry, the contemplation of organic remains offered considerable advantages, as bearing on the question whether the operations of the great causes of change, in ancient Nature, moved at the same rate, or in the same spaces of time, as at present. He should not go through the series of organic remains, but refer to such plants and animals as had a bearing on the argument. He would remark, however, that the cellular parts of plants, and the cellular and soft tissues of animals, being easily decomposed, could not for the most part be expected to be found preserved in fossil remains; nor could we expect to find in formations, which had been shown to have taken place on the bed of the ancient sea, many remains of terrestrial plants or animals. Almost all marine plants being composed of cellular tissues, it was comparatively rare to find the remains of marine plants on the earth. The total number of fossil terrestrial plants hitherto found was about 1000, and it was known that there are more than 30,000 or 60,000 existing species. Generally speaking, the vascular plants (and not the cellular) were found in a fossil state. Having explained the difference between the hard wood, or forest trees, and the palms, &c., he commenced by pointing out drawings of the fossil ferns, which group belonged to the equisetia, or horse-tails; he referred to, and described, the *sigillaria* of the coal formation (so called from the stem being marked as if with the impressions of a seal), and adverted to the remarkable fossil trees on the line of the Bolton Railway—for the preservation of which, geologists were much indebted to Mr. Hargrave and the company. As these plants were very numerous, and almost characteristic of coal districts, in most parts of the British dominions, generally in the form of trees rising from the bed of coal to a moderate height, it became important to know what sort of plants they were, and whether identical with or analogous to any existing species. Marquis, the celebrated Bavarian traveller, when in South America, found reason to think that there was considerable analogy between these fossil plants and the large specimens of *ephorbia* and *cacti* on the plains of that continent. In the trees on the Bolton Railway there was a remarkable system of dividing roots; beginning with four, each dividing into two, and these again dividing. Brongniart had investigated this subject with the utmost possible zeal, and the result of his inquiries was, that these plants, by the peculiar character of the base of their leaves, the manner in which their stems were ranged, and the fluting of their stems, &c., though not exactly identical with, were very nearly allied to, the tree ferns. Considerable progress had been made with the trees on the Bolton Railway, by the late much-lamented Mr. Bowman, in ascertaining the character of the exterior of these plants, considerable additions had been made to the knowledge of the interior structure by Brongniart; and the observations of both tended to modify the views first taken by Brongniart, and showed there was some degree of approximation to the *cacti*, as observed by Marquis. The probability was, that these ancient plants, as could be shown in other cases, united the characters of two distinct existing classes. The *ephorbia* and *cacti*, and also the tree ferns, were now found existing only in warm climates—not limited to the torrid zone, but extending as far south as Van Diemen's Land, and as far north as the Canary Islands. Yet these fossil plants were found spread over all the coal basins of Europe and North America, very far beyond the latitudes where it was now possible for tree ferns to grow in the open air. So existing *ephorbia*, though scattered over most parts of the globe, were found largest in the warm damp islands of tropical regions. They were much larger in Brazil than here; and, as the fossil plants most nearly resembling them were found in this country, much larger than any now existing, the conclusion was, that the climate must then have been probably much warmer. The *lepidodendron*, another fossil plant common in the coal districts, the interior texture of which had been examined by Brongniart, was found to have some striking analogies in internal structure to a little moss, common over the hills between Manchester and Derbyshire, called the *hypnum*, or wolf's-claw. Professor Phillips found also a great external analogy to these fossil plants in the *conferva*, or pieces; so that a fossil plant may have the essential characters of the *hypnum*, and others also analogous to the modern *conferva*. As to these plants he could draw an inference from the climate which seemed best suited to the modern *hypnum*; for even the tropical varieties were so small that it was vain to quote them as any proof of the superiority of the ancient climate. He exhibited a drawing of the probable appearance or "restoration" of the ancient tree ferns and other immense fossil plants, as they might be supposed to exist in the remote periods referred to. Another interesting fossil group, sometimes ranked with the tree ferns, sometimes with the palms, was the *raia*, of which many leaves, &c., were found on the coast of Yorkshire, in the island of Borneo, in Germany, &c. The modern *raia* belonged to warm climates, and hence the conclusion, that the climate of the world, at the growth of these fossil plants, was warmer than at present. He next passed to the consideration of many remarkable fossils of the animal kingdom, for the purpose of ascertaining the degree of affinity they present to existing tribes. He first noticed the discovery by Professor Ehrenberg, of Berlin, of a deposit about fourteen feet below the surface, in Bohemia, a solid mass consisting almost wholly of the silicious or flinty remains of minute fossil *infusoria*. Correcting the erroneous impression (thence derived perhaps) into which some had fallen, that the whole of our chalk formations, 500 or 600 feet in thickness, were composed of these small creatures, the lecturer next passed to the sponges—including the sponges (which some thought plants, but which he deemed to be animals), numerous beautiful cellular corallines, and large corals; distinguishing the sponges into the soft, elastic, cellular group, of which the sponge in common use was a specimen, and another group in which the tissue was interlarded with a number of sharp silicious spicules, or needles. The chalk deposits contained this latter kind, and the needles might be obtained detached by washing the chalk. This class of sponge was now found on our shores and those of Australia; but on our shores there were few or none of the elastic sponge which was found on the shores of the Mediterranean. From New Holland were obtained sponges with elastic fibres, enlivened with silicious spicules—thus furnishing a slight confirmation of the warmer character of the water in which the fossil sponges occurred. The same conclusion would be found much stronger from a consideration of the fossil corals, of which there was a great variety. He showed drawings of two fossil corals, called the chain coral and the honeycomb coral, in juxtaposition with an existing species, the red organ-pipe coral, and said that upon our coasts were a few small corals, not to be compared with those large ones which form the coral reefs of warm latitudes, and which, he inferred, were most analogous in temperature to the localities where the abundant accumulations of coral took place in our latitudes in ancient times. He had marked the coral reefs on a map of the world, on Mercator's projection, which showed that on most reefs occurred beyond the latitude 34°, either north or south of the equator. In many of the limestone rocks, the immense accumulations of corals were such, that they might be compared with the modern reefs; and his conclusion was, that the sea, when these were formed, was of a similar character and temperature to that found in subtropical latitudes. From the star-fishes, which existed now in all parts of the world, an inference could be drawn as to ancient climate. There was, no doubt, very considerable analogy between the fossil corals and living groups, especially those on the coast of Australia, of which he exhibited some beautiful specimens. Of the plant-like *crinoides*, he exhibited drawings, one of the fossil (of which he said there were forty species in the limestone of Derbyshire and Yorkshire), and another of an existing animal, a spinous species of which was in the museum at Bristol, designed up from the deep water of the Indian sea. He close was the analogy, that it was difficult to distinguish between the fossil and the existing species. There was no known *crinoides*, except in the waters of the Indian sea, and hence he arrived at the same conclusion as to those in our latitudes, indicating a warmer atmosphere at the period of their deposition. As to the thousands of fossil shells, he could only notice a few points connected with them. Of the bivalves, the oyster was the type of an immense group—fossil specimens of which he exhibited, some attached to a pebble (one proof that the creature lived at or near the spot), others with the shells wide open, as after death, and the minute which formed the hinge in different stages of decay or preservation; others again with the shells closed, showing that these creatures were immobilized, some alive, others shortly after death; some at a time when the ligament alone remained, and others when it had wholly perished. The common (which had several characteristics of the recent nautilus), had no living representative; nor had the belemnites and other kindred groups of ancient fossil shells, yet these were so abundant in the formations, that several hundred species of ammonites were believed to exist in the British dominions since; he (Mr. Phillips) possessed 120 species, as well as forty species of belemnites, and great numbers of the other kinds. Of these shells, which abundantly filled the ancient rocks (had 20 or 100 ammonites might now be followed in a few days from the strata in Dorset), not one representative of type was now known to exist. Of the fossil trigones there was one representative in the recent fragments of New Holland, which creature was remarkable for possessing as also with cutaneous one form, nautilus, nautilus, and even nautilus quadrangulus. Of fossil crustaceans, more than 100 species of *brachiodonta* were known and described, all confined to the lower strata, lower having been found in the middle or upper, and no closely resembling forms were known to be now existing. All the nautilus hitherto found were invertebrate, and generally speaking without bones; he said noticed the nautilus division, which had a skeleton, bones, a bony case for the brain, and other circumstances indicating a higher condition of animal life. Of the fossil fishes there were about 1000 species; Agassiz enumerated 800; in the fossil state, in a short time ago, there were not known more than about

100 species, but Agassiz had stated publicly, that he was now acquainted with 200 species, and privately he had said that he had ascertained there were 1000 species. In this neighbourhood, an active and intelligent member of the Manchester Geological Society, Mr. Blossey, had distinguished himself by several very interesting discoveries, not only in this, but also in other localities, and had added very much indeed to our knowledge of fossil fishes. Mr. Phillips then mentioned a *megapteryx*, which he had cut out of the rock himself, and had at first marked the bones as belonging to a fossil fish; but, having sent it to Cuvier, he noted it to be a fish of the reptile kind. Agassiz had examined it, and, from the arrangement of the bones and the character of the teeth, deemed it a reptile. Mr. Blossey had a beautiful specimen of the *megapteryx*, and also one of the *holopteryx*. In noticing the first of the four divisions of reptiles, the salamanders, Mr. Phillips mentioned the remarkable specimen found 120 years ago in Switzerland, and figured by a Swiss naturalist, who described it as *homo diluvii testis*—an antediluvian man! It proved to be a salamander, with some analogies to those found in fresh water in the Alleghany range. The next division was the marine and fresh water turtles, and land tortoises, which were found in great abundance. In Solihull, Mr. Huby found forty species of fossil tortoises, and an exceedingly beautiful specimen had been dug up at Harwich. Of these creatures the living species generally belonged to warm climates. The next group, the fossil crocodiles and lizards, was a numerous one. He showed drawings of the heads of fossil crocodiles found on the coasts of Yorkshire and Dorsetshire, which resembled not so much the existing crocodile of the Nile, or the alligator of the Mississippi, as the gavial of the Ganges. He exhibited a drawing of a *pleiosaurus* (restored), with its singular paddles like those of the turtle or the whale; and another of the *ichthyosaurus* (or fish-lizard), observing that Professor Owen had discovered that its tail was commonly broken at a certain point, whence it was inferred that it had a spreading extremity like that of the whale, only vertical instead of being horizontal. The *ichthyosaurus* were twenty-four to thirty feet in length; the *pleiosaurus*, fifteen to twenty feet. The latter were now much valued, and 350*l.* had been given for one at Whitby for the museum at Cambridge. The remains of another immense saurian, named, by Dr. Buckland, the *megalosaurus*, or great lizard, were estimated to belong to a creature forty-five feet long; but Professor Owen's latest investigations had reduced the size to thirty feet. Dr. Mantell had estimated the *iguanodon* at seventy feet in length; but this length, he believed, more accurate investigation would reduce to about forty feet. The flying lizard did not float as the flying bat, but had wings, and moved through the air as a bird. What inferences as to climate could be drawn from these fossil reptiles? The fossil crocodiles were similar in size to those now in existence. The *ichthyosaurus*, *pleiosaurus*, *iguanodon*, presented analogies to the lizards and crocodiles; and one general fact was, that all existing reptiles depend greatly for the exercise of the vital functions upon temperature. The nature of their circulation rendered them to some degree cold-blooded animals; and their vital functions were suspended below a certain temperature. In winter, frogs, toads, newts, &c., bury themselves in mud, in holes, and in hollow trees; serpents and lizards go into the ground; but not so in warm climates; there their periods of rest were of a different kind. The warm regions of the globe were peculiarly favourable to the existence of the *batrachian* reptiles—the turtles, tortoises, and all the tribes analogous to the crocodile and the lizard. The conclusion then became strengthened from that cause alone, that the ancient climate of the earth, both on land and in the sea, was of a character analogous to that now found in the warmer regions of the globe. These were conclusions derived from sources separate and distinct from those referred to in the former lectures, as derived from the formation of the unstratified and stratified rocks, and the analogies found in inorganic nature to those of the present day. And, as these conclusions all tended to the same point, probably it might be regarded as established, that the climate of these parts of the world, where the stratified rocks contain the remains of plants, corals, and animals, at the time of their being imbedded, was analogous to the warmer climates of the globe at this day. As these remains were found at Christlana, in the Ural Mountains, in the American lakes, in Melville Island, and various other widely distant and differing localities, this was a conclusion of very great consequence, if we wished to understand the ancient condition of our planet.

## GEOLOGICAL SOCIETY OF LONDON.

MAY 18.—A Memoir on the Geological Structure of the Ural Mountains, by Mr. Marchison, M. de Vernoil, and Count Keyserling, was read.—The Ural Mountains have been explored for a century and a half by Russian miners, and they have been visited by various men of science, but their geological structure was far from being understood when the authors of this paper commenced their survey; still less had any observer attempted to identify the disconnected masses of the formations with the undisturbed types in other regions, and reduce them to a regular geological sequence. The great difficulties attending an examination of the chain, and due to its inaccessible nature throughout the greater portion of its extent, must account, in part, for the structure of the formations not having been duly investigated; but it may be also stated that the pursuits of the miner, or of the man of physical science, not requiring a strict attention to organic remains, that comparison of the fossiliferous strata had not been attempted, which can alone lead to an identification of formations, and enable the practical field geologist to assign disjunct or inverted masses of rock to their proper position. In laying the memoir before the society, the authors beg that it may be considered not merely as the result of what fell under their own notice, but as embodying also the information they obtained from scientific Russian officers at the several mining establishments, as well as that contained in the published works of preceding observers. They also bear ample testimony to the spirit with which they were received throughout their journey. After describing the physical features of the Ural Mountains, and the passes by which they may be traversed, the authors proceed to detail the structure of the formations, both sedimentary and igneous, dwelling on the effects produced by the latter, and on the fossil evidence whereby they have been enabled to place the former on a parallel with well known series of rocks in other parts of Russia and western Europe. The axis, or central portion of the chain, consists, to a great extent, of ancient sedimentary strata, for the most part in a highly metamorphic condition, in consequence of numerous syenitic and trap rocks; but referred by the authors, on account of the presence of certain organic remains, traceable at intervals in limestone, to the Silurian series. Along the eastern flank, the most accessible by reason of the mining establishments, the strata are also greatly altered by the prevalence of igneous rocks; and it was only along the western flank that the authors were enabled to establish a clear succession of carboniferous, Devonian, and Silurian deposits. The evidence on which these inferences rest, is given at length in a series of detailed sections obtained in river gorges and by other accessible lines; and, notwithstanding the greatly dislocated nature of the strata, a clear passage is shown to exist from the Permian beds, described in a former memoir, into the carboniferous system, and thence into the Devonian, and afterwards into the Silurian. Explanatory accounts of variations of lithological character from the ordinary types are likewise given; and a certain amount of specific difference in the organic remains is also enumerated, and it is shown that the culture of testacea, and other fossils, agree with those of well determined carboniferous, Devonian, and Silurian regions, and are totally distinct from the organic forms of any other series of rocks. Full descriptions, which do not admit of abridgement, are given of the various igneous rocks, of their effects upon the sedimentary strata, and of the metallic veins connected with them. It may, however, be stated as an interesting fact, that true granite is of very rare occurrence along the axis of the chain. Another point of great interest, discussed in the memoir, is connected with the periods of dislocation, the change of relative level of land and water, and of the protrusion of igneous rocks. The authors offer, in detail, their reasons for concluding that these phenomena were repeated at different geological epochs. From the occurrence of cupiferous minerals, diffused throughout the Permian strata, they infer that, anterior to the deposition of those beds, metallic veins must have existed in the Ural Mountains; and, from the abundance of the remains of terrestrial plants in the same deposits, that the chain must have been raised to a certain extent above the level of the then existing ocean. Subsequent periods of dislocation are proved by the lines of disturbance in the Permian series on the immediate flank of the Ural Mountains, and connected with dislocations which have affected them. The patches of Jurassic rocks, at the northern and southern extremities of the range, are considered by the authors to have been subsequently denuded, and the absence of strata of that age throughout the great mass of the chain, or for 18 deg. of latitude, to prove that it was constantly above the level of the sea during the Jurassic epoch. Between that period and the accumulation of the gold alluvia, there are no signs of any great changes in the physical structure of the Ural, and the only deposits assignable to that interval are certain trachytic grits and beds of lignite, which it is considered may have been formed in lakes. The authors next proceed to describe the gold alluvia distributed along the eastern flank of the chain, and to point out, first, the connection which subsists between this superficial detritus and the adjacent rocks, and afterwards to deduce from the evidence afforded by the deposits the true age of the accumulation. The authors are of opinion that the *quartzites*, and other veins from which the gold detritus was derived, were produced by one of the last of the igneous intrusions which have affected the Ural Mountains, or the veins themselves and only the schists and gneisses, and even the granite and syenitic rocks. They also show that the gold alluvia belongs to the ordinary course, lateral detritus of the country, and has been derived from the adjacent rocks. With respect to the relative age of the deposit, it is proved that the accumulation must have taken place subsequently to the period when the chain had subsided, to a great extent, its present modification of shape and valleys, yet anterior to the existing conditions of the surface, because it occurs in considerable thickness at points beyond the reach of the streams which now traverse the country, and because it con-

tains the remains of extinct mammals. Another question of great interest, dealt upon in the paper, is the total absence, on both flanks of the Ural Mountains, of erratic blocks, and, as far as the authors' observations extended, of any traces of these scratches, grooves, and polishings, which are considered, by the advocates of the glacial theory, to be proofs of the former existence of glaciers; and it is stated as an argument in support of the objections previously advanced by the authors against these views, that in the northern portion of the chain, between 60 deg. and 65 deg. of latitude, no glaciers are found on peaks constantly covered with snow, and attaining an altitude exceeding that of the highest mountains of the British Isles. This absence of all the phenomena of glacial action, must, they contend, utterly exclude the possibility of the lower or flat regions of Russia having been once invested in a cocoon of ice. The problem connected with the entombment of mammalian remains in the gold alluvia, as well as in alluvium generally, the authors state, is extremely difficult of solution, but that by whatever means the universal destruction of these great mammals, during one particular period, may be attempted to be explained, they conceive that it was owing, in the district under consideration, including the low regions extending from each flank of Ural, to an elevation whereby a change to a colder climate was effected.

## DUDLEY AND MIDLAND GEOLOGICAL SOCIETY.

The first quarterly meeting of this society was held at Dudley, on Tuesday, the 7th inst.; the chair was taken by J. H. H. Foxy, Esq., and the attendance on the occasion was both numerous and highly respectable. The report on the igneous rocks of the South Staffordshire coal-field, which had been drawn up by the sub-committee appointed for that purpose, was laid before the meeting. The report entered fully into the examination of the various circumstances under which these rocks are present in this district, both in those localities where they are found at the surface, as at Blarney Hill, Northerton Hills, the Rowley Hills, Pow Hill, &c., and in those where they are met with only in mining operations, in the shape of beds lying within the coal measures. The position of these beds of igneous rocks was illustrated by a number of highly important sections taken from actual workings, both in the Dudley and Wolverhampton districts, and showing most conclusively the true character of the beds of "green rock," as they are locally termed, which extend over so large a portion of our coal-fields, and which, from their peculiar position on, great irregularity, and extreme hardness, often furnish some of the most formidable difficulties which the miner has to encounter. The connection of some of the "faults" which traverse this coal-field with the principal points of elevation of these igneous rocks was then pointed out, and the mineral characters of these rocks, and the important changes produced by them on the coal measures with which they come in contact, were illustrated by numerous specimens. After the meeting, a party was formed for an excursion to the Rowley Hills, where the various quarries, now opened so extensively, furnish good opportunities for examining the mineral character of these rocks, and especially the beautiful instances of columnar structure which Peat Quarry and Bare Hill Quarry present. The day was remarkably fine, and the company separated highly pleased both with the proceedings of the meeting and the afternoon's excursion. We were glad to hear that the society had received a large addition to its subscribers since the first general meeting, and that the collection in its museum was steadily increasing.

## INSTITUTION OF CIVIL ENGINEERS.

JUNE 14.—A paper was read "On the Sinking and Tabbings of Coal Pits in the North of England," by Mr. Atkinson, in which was detailed, in a very complete manner, the methods adopted for sinking the pits down to the coal through sand, water, and peristable rock, demanding the most extraordinary precautions; and, even when they are so sunk, the weight of water lifted by the pumping-engines amounts, in many instances, to more than four times that of the coal brought from the mine; for instance, at the Peasey Main Colliery, the water drawn per day equals 3925 tons, while the weight of the coals raised in the same time only amounts to 636 tons. The power employed to perform this work is very considerable, and the most incessant care is demanded to prevent accidents. All the precautions to be taken were very accurately described, and illustrated by a large series of drawings and models. The details of the sinking of several peculiarly difficult shafts were given, and the opinion of the author's uncle, Mr. Biddle (who is the best authority in these matters), were quoted as to the soundness of the methods recommended. The paper appeared of a very valuable character, and although the long reading to a mixed assembly, will be of great value to the profession, as it is evidently the work of a person well versed in the subject on which he has written.

The paper by Mr. J. J. Wilkinson, "On Iron Sheathing, Broad-headed Nails, and Inner Sheathing for Ships," was the termination of the series commenced during the last, and carried into the present session; it contained many valuable facts on the various points, and an elaborate list of patents connected with shipping, which will, no doubt, be very useful for reference.

## ON THE TEMPERATURE OF THE OCEAN.

BY R. HARRISON, Esq.

During the short period which has elapsed since Agassiz first published his glacial theory, evidences of glacial action have been discovered not only over a great part of Europe, but also in America. Mäclaren, in the *Adelsborgs New Philosophical Journal*, in reference to the traces of glaciers in that region, states, that proofs of the former existence of glaciers are found, with a few local exceptions, over a breadth of 2000 miles, extending from Canada to Florida. The soil of Persia is also said to contain gravel, consisting of flint and gypsum. The only positive notice that I am aware of, of the absence of boulders, is by Humboldt, in South America, which appears to favour the opinion of that region being of subsequent origin to the glacial epoch.

With regard to the *excessu quærit*, the temperature of the greatest density of sea water, *Roemer* remarks, p. 238, of his *Voyage to Greenland*:—"I have invariably found it to be warmer below than at the surface. This exception, therefore, is remarkable," referring to an experiment before-mentioned, in which he found the temperature at the surface to be 34° Fahrenheit, while, within five fathoms of the bottom, the thermometer registered 29°. "On my first trial," he says, "made in the summer of 1810, in lat. 76° 16', long. 9° east, the temperature, at the depth of 1360 feet, was found to be 33° 3' (by the water brought up), whilst at the surface it was 28° 8'." This experiment is detailed in a tabular form, in the first volume of his account of the arctic regions, p. 187, as follows:—

Lat.	Long.	Depth.	Temp. at surf.	Temp. at bottom.	Colour.	Time.
76 16	9	1360	28.8	33.3	Blue	12 10 April, 1810
76 16	9	1360	28.8	33.3	Blue	12 10 April, 1810
76 16	9	1360	28.8	33.3	Blue	12 10 April, 1810
76 16	9	1360	28.8	33.3	Blue	12 10 April, 1810

The specific gravity of the sea in lat. 76° 16', strictly coincides with the conclusion that the water of the ocean increases in density in a similar manner with fresh water. We find also from the above table, that, at the depth of 1360 feet, the density of the water was less than at 640 ft. above; its temperature being also slightly lower, showing that the density of the sea is comparatively little influenced by experimental pressure. Other experiments are recorded in the same work, but they are not so conclusive as a nature, although they in general confirm the above opinions as to the temperature of the greatest density of sea water; for the density is very much affected by the different quantities of saline matter held in solution, and also by the presence or absence of medius and marine animals. The following table, compiled from the same work, shows the quantity of saline contents, as well as the specific gravity and temperature of the sea at the surface:—

Lat.	Long.	Sp. grav.	Temp. at surf.	Colour.	Sal. cont. p. ct.
44 38	2 28	1.0260	48.5	Blue	2.74
44 38	2 28	1.0260	48.5	Blue	2.74
44 38	2 28	1.0260	48.5	Blue	2.74
44 38	2 28	1.0260	48.5	Blue	2.74
44 38	2 28	1.0260	48.5	Blue	2.74
44 38	2 28	1.0260	48.5	Blue	2.74
44 38	2 28	1.0260	48.5	Blue	2.74
44 38	2 28	1.0260	48.5	Blue	2.74
44 38	2 28	1.0260	48.5	Blue	2.74
44 38	2 28	1.0260	48.5	Blue	2.74

It may be remarked on the foregoing table, that the observations 1, 2, and 3, in which the temperature was near that of the greatest density of fresh water, the specific gravity was also greatest; whilst in the observations 7 and 10, in which are found the largest portion of saline contents, the temperature being considerably less, the specific gravity is the smallest record of, with the exception of 7 and 11, which contain the smallest quantity of saline contents. The other observations generally favour the conclusion, that the sea is at its greatest density at or near to the temperature of 40° Fahr., with the exception of the second, which, from its anomalous nature, probably contains some error.

In conclusion, I have to state, that I am aware of no experiment that is collectively assumed for the temperature of the sea decreases with the depth in lower latitudes than 70°, whilst in higher the reverse is the case, except that the waters of the ocean are similarly influenced by fresh water, and are also at their greatest density near to the temperature of 40° Fahr.—Trans. Manchester Geological Society.



## MEETINGS OF SCIENTIFIC BODIES.

## IN THE MINING WEEK.

SOCIETY.	PLACE OF MEETING.	DAY.	HOUR.
Royal Asiatic	14, Grafton-street	Saturday	2 P.M.
Geological	4, St. Martin's-place	Monday	3 P.M.
London	John-street	Tuesday	3 P.M.
Naturalists	21, Regent-street	Tuesday	3 P.M.
Civil Engineers	25, Great George-street	Tuesday	3 P.M.
London Electrical	Adelaide-street	Tuesday	3 P.M.
Medical	22, Bedford-street	Wednesday	3 P.M.
Microscopical	21, Bedford-street	Wednesday	3 P.M.
Mathematical	Crispin-street, Spitalfields	Saturday	8 P.M.

## PUBLIC COMPANIES.

## MEETINGS.

Duncombe Mining Company	25, North-lane	June 21	2.
Geological Assurance Company	11, Lombard-street	22	12.
Royal Exchange Assurance	71, Lombard-street	22	1.
Union Bank of Australia	20, Old Broad-street	23	1.
Minerva Life Assurance	24, King William-street	23	12-1.
Law Life Assurance Society	Office, Fleet-street	24	11.
British Steam Navigation	George and Vulture Taverns	27	12-1.
Equitable Gas Light Company	21, John-street, Adelphi	27	12.
London and North Wall Railway	London Tavern	27	12-1.
South Australian Mining Co.	15, Old Broad-street	29	12.
New Granada Mining Company	15, Austin-street	29	12.
South Australian Company	4, New Broad-street	29	12.
European Gas Company	29, Finsbury-circus	29	12.
Imperial Brazilian Mining	Office, Broad-street	30	1.
Commercial Steam Packet Co.	London Tavern	July 1	12.
Bedouin Consolidated Mining Co.	44, Finsbury-square	1	12.
Queen's Mining Company	44, Finsbury-square	1	12.
Don-Brown Mining Company	44, Finsbury-square	1	12.
Commercial Bank	London Tavern	2	12-1.
Anglo-Mexican Mining And	5, Broad-street, buildings	6	1.
Argentine Iron and Coal Company	5, Liverpool-street	12	1.
U. S. Iron Bank and Coal	Bank House, Moorgate	13	12.

## CALLS.

Vincero Mining Company	14, June 21	Bayly, Baskerville, and Co.
West Wall Jewell Mining	19, July 25	London and Westminster Bank
London and Birmingham Rwy	10, July 25	As former calls.
Union Bank of Australia	21, August 2	London Joint-Stock Bank.

## DIVIDENDS.

Royal Polytechnic Institution	5 per cent., 300, Regent-street	June
Mineralogical Joint-Stock Company	75 per cent., 10 Bush-lane, Cannon-st.	20.
Bank of British North America	24, per share, at the bank	July 5.
Grand Junction Water-works	(as usual), at the office	19.
Anglo-Mexican Mining And	5 per cent., at the office and branches	19.
Provincial Bank of Ireland	5 per cent., 42, Old Broad-st.	19.

## NOTICES TO CORRESPONDENTS.

**VICTORIA IRON WORKS.**—In reply to a correspondent, who inquires whether the company was sold and sold or bought in 1871—we have to reply, the latter. We believe the property is still in the market, and that some parties are "sitting" at it.

**J. J. (Chillingham).**—The paper referred to has not come to hand. It is now some time since any communication has been received from our correspondent—doubtless, we shall hear from him in the course of a week or two.

**F. J. (Bedford).**—Platina is generally understood to have been discovered in 1763, by Antonio de Ulloa. The metal, however, we believe, was known before that time, under the name of "white silver."

**W. M. (London).**—Mr. Charles Hunt's *Practical Treatise on Warming Buildings by Hot Water*, and an inquiry into the Loss of Radiant and Conducted Heat, by 1874, and at some length in the *Mining Journal* for January, 1875.

**TO AUTHORS AND CORRESPONDENTS.**—The Editor will feel much indebted to correspondents, and other Agents of mines, who, at the time of the transmission of specimens of ore, labeled with the local designation of the mineral, and also the name, with the view of placing them in a collection, now being formed, having for its object the classification of the several minerals of the various districts—authorizing thereby such statistical information as can be acquired. Plans, or sections of mines, with particulars as to the direction and underlying of lodes, with notices of houses, even over the faults, &c., will be highly acceptable, and will be placed in cases, in which reference may, at any time, be made by the contributors. It is proposed, from time to time, to give papers, treating on particular districts, in the columns of the Journal, with an illustrative plan, or section.

THE MINING JOURNAL,  
Railway and Commercial Gazette.

LONDON, JUNE 18, 1872.

On subject of the tariff our lips are still sealed, and hence our silence on the observations of "R. W.," inserted in our last Number. That a slight change will take place as regards the duty on the import of copper ores we have reason to feel confident, but that it will not effect any material benefit, or prevent the serious injury which must be inflicted on our home mines, is too clear.

Our correspondence from the mining districts, for the last few weeks, has borne a most discouraging, if not a disastrous, aspect; and it is with regret we find the accounts so received to be not only corroborated, but even exceeded, by statements disseminated through other channels, and, amongst others, even by one of the organs of Government. The following extract, from the *Times* of yesterday, will plainly illustrate the position in which one mineral district alone is placed from the measures adopted by Parliament:—

**DISASTERS IN THE COUNTRY.**—*Falmouth, June 14.*—There are at least from some 10,000 men out of employ in the mining districts west of Truro, with a considerable number of women, boys, and girls, whose occupations are connected with the mines in these parts. The want of employment arises from the stoppage of several mines recently, some because of the low market price of tin—others from the panic created among the shareholders by the new tariff duty on foreign copper, and by the material workings out of the profitable levels in not a few of the remainder. No one can calculate on the results, the minds of the mining population having been for some time past in a critical state, and of which the authorities are fully aware.

It will be seen, then, upon the authority of the Government leading organ (*the Times*), that "there are at least from 10,000 to 20,000 men out of employ in the mining districts west of Truro, with a considerable number of women, boys, and girls." The persons so employed may at least be considered as representing 30,000 to 35,000 individuals dependent on the mines for support—and these, it must be observed, are "west of Truro." We then approach the causes to which are to be attributed the want of employment, which we find to arise "from the stoppage of several mines recently—some because of the low market price of tin—others from the panic created among the shareholders by the New Tariff duty on foreign copper." Such are the remarks of our contemporary, and, despite his advocacy of the tariff scheme, which not only "Puts" off the profits, but does not even allow us a stone of ore to be considered a *blind stone* when raised to surface, yet we find him use the following expressions:—"No one can calculate on the results, the minds of the mining population having been for some time past in a critical state, and of which the authorities are fully aware."

Here, then, we have evidence from an adverse quarter of the consequences of these opinions we have advanced. Mines are abandoned because it is hopeless to prosecute them with advantage,—the low price of tin again causes them to be relinquished—and then we come to the panic created by the tariff; these are the main causes, we are told, to which is to be attributed the want of employment. Thus, it is manifestly proved, that, so far as relates to our copper and tin mines, the cause adverted to—that of the tariff—has already partially produced its effect. We fear that subsequent accounts will only render this more obvious, and only trust that, as the tariff becomes law, the Administration will see the serious consequences which must arise, and will, therefore, make such alterations as may tend to the amelioration of the working mines, and not render the burdens of the country greater than they now are—which, we apprehend, will be fearfully felt by the

country gentlemen, who, instead of receiving rents for the little "holdings," will be called upon to subscribe their quota for the Poor Law "Unions."

It must be gratifying to all by whom science, combined with industry, is duly appreciated, whether considered in a philosophical or commercial point of view—as must it also be to those who feel with us the value and importance to be attached to the employment of capital in developing our mineral resources, to learn that in the case "CRANE v. PRICE," the judgment of the court has been delivered in favour of the plaintiff. This was a "consummation devoutly to be wished," and of which a brief notice will be found in our columns of to-day; but as the question is one of no slight importance as affects the iron trade of South Wales, we feel it right at least to offer some few words by way of comment.

It will be in the recollection of our readers, that some few years since Mr. CRANE, of the Yniscledwyn Works, in the Swansea Valley, took out a patent for the smelting of iron with anthracite, or stone coal, embracing therein the application of the "hot-blast," which had previously been patented by Mr. NEILSON, but confined to bituminous coal, which alone had, antecedent thereto, been applied to the smelting of iron ores. The saving effected in the consumption of fuel by NEILSON'S patent was such as to attract considerable attention, and, in particular localities, to render its adoption general. Mr. CRANE being located in a district where anthracite was most abundant, directed his attention to the use of that description of fuel, availing himself of the hot-blast, without raising the question as to the right of Mr. NEILSON to claim from him the royalty, or patent right, of 1s. per ton, usually charged by that gentleman. Mr. CRANE, after a series of experiments, secured a patent, and subsequently expended several thousand pounds in the construction of furnaces, and in making various trials in the manufacture of iron by the patented process. The devotion of time and capital, with persevering industry, having accomplished the object in view, pig-iron being smelted with 28 cwt. of anthracite to the ton (whereas anthracite had never before been successfully used), Mr. CRANE naturally sought to render his patent not only profitable to himself, by granting licenses to others, but to bring into profitable working a vast mineral district which had been deemed valueless—thus enhancing the value of property, and diminishing the cost of manufacture. The successful issue of Mr. CRANE'S experiments led to an expression of public opinion, and that gentleman was entertained at a public meeting, held at Swansea, when the value of the discovery was acknowledged by those who have, of late (as in the case of W. L. WREY, Esq., and others), shamefully attempted to deprive him of that which is now declared to be his lawful right. Mr. CRANE proceeded with his works, and attention having been directed to his patent, Messrs. PRICE, of Neath Abbey, a highly-respectable firm, determined on applying the patent to their furnaces at Neath, and accordingly communicated with Mr. CRANE, who allowed his furnace builder, or other agent, to advise Messrs. PRICE on the alterations necessary for the use of hot-blast, as applied to anthracite. Messrs. PRICE having altered their furnaces accordingly, took to the use of anthracite; but whether the description of anthracite possessed by them differed from that in the Swansea Valley, or whatever, might be the cause, those gentlemen stated that a certain admixture of bituminous coal with anthracite yielded either a better quality of iron, or, at least, was attended with better results than the use of anthracite alone.

Here, then, we arrive at the first question, which appears to have excited the attention of the Neath Abbey proprietors. We do not—say they—use anthracite alone, for which Mr. CRANE has a patent, but it is a mixture of anthracite and bituminous coal, and as Mr. NEILSON has taken out a patent for the use of the hot-blast in the manufacture of iron, all we have to do is to pay him for his patent right and we will try the question with Mr. CRANE whether Mr. NEILSON'S patent does not embrace all descriptions of fuel. It did not occur to these gentlemen, it would appear, that in this instance the hot-blast was applied to a description of fuel which had never been contemplated by Mr. NEILSON, nor had it ever been used successfully in the manufacture of iron, and hence Mr. CRANE'S patent was good, as the judgment of the court proves, in a legal point of view. We hope to have it in our power to give a copy of the judgment but, in the mean time, cannot forbear offering some observations on the case before us, for that it is disgraceful to the defendants, we think they could not themselves deny, and we can only hope that the fault, as in most cases, is with the lawyers, who care not what the result so that they get their fee.

When it is considered that several years have now passed by since Mr. CRANE obtained his patent—when it is further considered that, during a period when the iron trade was in a state of prosperity, this patent has laid dormant—when we again reflect that a large and important district, like that of the Swansea coal-field, has (so far as regards anthracite, and which also affects the ironstone measures) been comparatively unworked, and knowing that these have resulted from the acts of Messrs. PRICE and Co., of Neath Abbey, we would ask them—What have they not to answer for, and what reparation can they make to the man whom they would have ruined, or to the district whose labouring population would, but for their conduct, otherwise have been employed? Let us further see what has been the effect produced by the unprincipled course pursued by Messrs. PRICE in this action. Years have passed away without any beneficial results arising to any one party—their own furnaces have been put out of blast, because they found it cheaper to purchase their pig-iron from those (the Cambrian Company and others) who were obliged to lose money on their "makes" than to work themselves, and they have precluded the patentee from entering into engagements with other works, for all parties were waiting the issue of the trial, while the Trefylfa Iron Works, situated some three or four miles from Yniscledwyn, have, we believe, been carrying on in the hope that they would, by the decision of the court, not be called upon to pay any patent right. Such are a few of the consequences, and we trust that Mr. CRANE will witness all such "unprincipled knavery," now that he has the power, as "by law decreed."

If we take another view of the question, as affects us nationally, we shall find that while we have been sleeping our trans-Atlantic friends have been wide awake—Jonathan has very judiciously opened his eyes to what we can do in this country, and having a "nation's sight" of that same anthracite in Pennsylvania, in the neighbourhood of Pittsville, he immediately sends over to Mr. CRANE, requests him to forward the necessary workmen to erect furnaces with fire-brick, castings, &c., and, indeed, all materials for their construction, and at once proceeds to the manufacture of iron in America from anthracite, which has not only succeeded, but is rapidly "progressing." Such is the result of the refusal on the part of Messrs. PRICE to pay a just claim, or do unto their neighbour as they could wish to be done unto. Yet they are of the order of "friends."

We are glad to find, by a letter addressed by Sir R. R. VIVIAN (Member for Helston) to his constituents, that the injustice done to the country by Ministers, as affects our home mines, is fairly put forward. The hon. Baronet has spoken out, justifying the course he has taken, and confirming, by his mature judgment, and acknowledged talent and ability, combined with local knowledge, the opinions we have so oft expressed in our columns—viz., that the duty proposed by Government was such as must be destructive to the mining industry of this kingdom—but we will let the hon. Bart. speak for himself:—"When I ascertained (says he) that a deputation from Cornwall had been instructed to petition the Ministers for a modification of their intentions, I consulted some gentlemen who were practical miners, and largely interested in the Cornish mines, and I arrived at the conviction that the protection which the deputation were advised to solicit was insufficient. Under this impression I declined accompanying them when they conferred with the Prime Minister in Downing-street, because my presence on that occasion would either have implied a tacit acquiescence in their opinions had I been silent, or it would have promoted an inconvenient, and worse than useless, discussion in his hearing, if I had declared my disagreement, and protested against their course of proceeding. Subsequent events justified my view of the subject; they afterwards submitted a memorial to the Board of Trade, in which they increased their demand for protection against foreign copper ores from 7 1/2 10s. upon the ton of metal—the duty originally recommended at that conference—to 10s. per ton, which will not enable our deep mines to contend against the rich mineral productions of Cuba and Chili. In the unsatisfactory debate which took place in the House of Commons, all the other Members representing the British mining interests contended for no greater protection than 7 1/2 10s. It is my belief that most of our deep copper mines will be seriously injured, if not altogether abandoned, unless the importers of foreign copper be compelled to pay a much higher duty; and this conviction is based upon statistical documents, the accuracy of which has never been questioned. But to have insisted upon it in debate, in opposition to the language of other Cornish representatives, would have exposed me to the imputation of being an alarmist, and of affecting to know more, and to see further, than those who opposed the Ministerial propositions; for such is the certain result of every man's endeavour to urge his own individual opinion in a popular assembly like the House of Commons, when he is unsupported by the concurrence of Members who are, at least, as much interested as he is in the matter under discussion."

We have not space to enter at length on the honest and sensible address of the hon. Member, who, in offering his "deliberate advice to the miners in general, upon the conduct which seems the best suited to their perilous position," evinces a knowledge of the subject, which must be gratifying to every Cornishman, as proving that there is at least one of the Members sent by them to represent the interests of the mining community in Cornwall, possessing power of judgment and honesty of expression. Our opinion of the miners' "pet," Sir CHARLES LEMON, and of Mr. TURNER and his absurd amendment, are before our readers. We trust that Cornishmen will, "one and all," teach the SECRETARY for IRELAND, as well as other Members, when they next seek their votes, that there is a duty incumbent upon the representative, which neither the love of office nor emolument should allow him to lose sight of—while apathy and indifference to the state of the working miner, who, perhaps, possesses not a vote, will not be forgotten by those who enjoy that privilege.

The question of the policy of inflicting on the coal proprietor a duty on coal exported from this country (in most cases for the purposes of steam navigation, and the application of gas in continental towns), has been brought before the House of Commons, and, with an imperfect knowledge of the subject on which the Members were called upon to legislate, it has been determined that 2s. per ton shall be levied on all coal shipped from this country. Arguments have been employed, fallacious in themselves, as they must have been known to be even by those who used them—it has been advanced that coal not being reproductive, when once worked out could not be regained—this is undoubtedly true. Further, that this country, by the export of coal, gives to other nations a benefit which their geological construction does not afford them, forgetting, at the same time, the advantages derived by this country in working our collieries—finding a vent for coal which most otherwise remain *in situ*, besides employing and upholding the maritime interest. It is hardly necessary to state, that discoveries in the coal series, of late years, have developed sources of abundance for centuries to come, even with our increased use, while the progress of chemical science throws even a doubt on an increased consumption—indeed, we can hardly imagine any one possessing common sense could have imposed a duty on our export of this article, but more especially those who advocate the principles of free trade.

That the representations of the Members representing the coal districts have had some effect, is demonstrated by the reduction on the part of Ministers from 4s. to 2s. per ton, making, as they say, a loss to the revenue (as contemplated by them) of 60,000,000 per annum. While we admit the policy of the compromise, as so designated in the House, entered into by Government with the coal proprietors, under circumstances (it being clear that, as regards the tariff, Ministers, supported by the "opposition," can carry any measure they propose, however injurious it may be to the country), it is to be regretted that an impost has been fixed which is partial in its application, for it must be remembered that it applies only to certain districts, and does not affect the inland collieries—indeed, it may be said to be confined to the North, and to Swansea. One advantage which the latter part has derived, and which renders it desirable for the importation of foreign ores, is that of taking coal as ballast, which is obtained at from 3s. 6d. to 3s. 7d. per ton; but if we are to add to this 2s. per ton export duty, we have at once 5d. per cent. as a tax, which may even tend against the advantages heretofore derived, and although we have no serious apprehensions of foreign ores going to any other country to be smelted, yet the effect will be felt by the miner, for all charges attendant on the ship will be an additional charge on the cargo, as, in like manner, the greater the facilities afforded, so will be the reduction in the freight.

We have inserted in another column the proceedings in Parliament touching on this subject, and, while generally directing notice therein, would draw attention to the import duties levied by other nations—for instance, France, Holland, Belgium, Prussia,



and the United States—the latter claiming 6s. 8d. per ton, while in some cases the import duty is 11s. 8d. Surely, this is a sufficient preventive against the exportation of coal for manufacturing purposes at least, for, as regards steam navigation, the coal is not subjected to these duties. The natural consequence arising out of this export duty will be the development of the mineral resources of other countries, and the diminution of our supply, and, necessarily, the vessels employed; for, when it is considered that the coal put on board does not exceed 4s. to 6s. per ton, which is vended abroad (we believe we are correct in saying), in some cases, at 30s. to 35s. per ton, it must be apparent that the export of coal not only benefits the collier and the coal proprietor, but the trader, the ports from whence it is shipped, the mariner, and others indirectly interested. It is some satisfaction, in one point of view, that the operation of this enactment is partial, but, at the same time, it cannot but be regretted that injustice should be done to "the few," without any advantage, so far as we can see, arising to "the many."

#### DISTRIBUTION OF CAPITAL AND LABOUR IN THE UNITED STATES.

The following statements are derived from the official returns made to Congress by the Marshals appointed to take the late census:—

**CAPITAL INVESTED IN**  
Working mines ..... \$ 31,473,710  
Commerce ..... 290,073,423  
[This is independent of capital invested in agriculture, and the products of the forests.]

**MINES—IRON.**  
Furnaces ..... 814  
Tons of cast-iron produced ..... 296,583  
Forges and rolling-mills ..... 793  
Bar-iron produced, tons ..... 197,933

**LEAD.**  
Smelting-houses ..... 129  
Pounds produced ..... \$1,239,453  
GOLD.  
Smelting-houses ..... 127  
Value produced ..... \$29,060  
Capital invested ..... \$234,303

**OTHER METALS.**  
Value produced ..... \$79,614  
Capital invested ..... \$33,990

**COAL.**  
Anthracite, tons ..... 82,009  
Men employed ..... 2,893  
Capital invested ..... \$4,355,593

**DOMESTIC RAIL.**  
Bushels produced ..... 6,179,174  
Capital invested ..... \$9,996,043

**GRANITE AND OTHER STONES.**  
Value produced ..... \$3,601,844  
Capital invested ..... \$2,540,110

**NUMBER OF PERSONS EMPLOYED IN**  
Mining ..... 18,993  
Agriculture ..... 3,527,738  
Commerce ..... 117,335  
Manufactures and trades ..... 791,543

**MANUFACTURES.**  
Machinery, value of ..... \$10,000,000  
Men employed ..... 1,506  
Hardware & cutlery, value of ..... \$6,541,967  
Men employed ..... 6,067  
Cannon, number cast ..... 3,774  
Small arms made ..... 85,272  
Men employed ..... 1,746  
Precision metals, value ..... \$4,736,900  
Capital invested in the above ..... \$20,000,000

#### PRUSSIA—IMPORTS OF METALS AND MINERAL PRODUCE.

The Prussian State Gazette, amongst other statistical details in connection with the new tariff of the Zollverein, publishes the following as the quantities of metals imported in 1849 and 1841 into Prussia and the Union.

**IRON AND STEEL—PRUSSIA.**  
Raw and cast-iron, bars, rails, &c., at \$1 ..... cwt. 489,319  
Forged iron, anchors, plates, &c., at \$2 ..... 27,619

**THE UNION.**  
Raw and cast-iron, bars, rails, &c., at \$1 ..... cwt. 791,779  
Forged iron, anchors, plates, &c., at \$2 ..... 31,987

The increased importation of rough iron goods is, of course, accounted for by the extension of railroads in Germany, and must increase. The prices at which iron is now offered by the trade in England are such as to defy competition; and the German producers are clamorous for more protection than the present duties of 3 guineas and 9 guineas per ton. It does not, however, appear likely that the Germans will impose so heavy a check upon industry as to raise them would prove. Machinery is likely still to be furnished, chiefly by the French, who have of late paid great attention to it, and who furnish mill-works of great beauty from Mulhausen, under the favour of our absurd prohibition.

**COALS.**  
Prussia. 1841. 1849. The Union. 1841. 1849.  
Pit coal ..... tons 199,584 ..... 186,400 ..... 651,000 ..... 127,000 ..... 157,000

#### ON PREVENTING THE CRYSTALLISATION OF IRON.

An interesting paper was read at a late sitting of the Paris Academy of Sciences, by M. François, an engineer of mines, on the means of preventing the crystallisation of iron used in machinery. On the examination of the ruptured axle of the engine which was the cause of the late calamity on the Versailles Railway, the conclusion came to was, that the rupture had been caused by this crystallisation, the iron being of the best quality, and of a volume more than sufficient for the purpose to which it was applied. Similar results on other railways have been ascribed to the same cause; but no person has been successful in the means of preventing the recurrence of accidents by an improved mode of manufacturing the iron, and all that could be done in the way of prevention was, not to permit iron axles to remain in use for so long a period as to undergo the crystalline change, which is so fatal, and of which external appearances give no indication. M. François informs us, that, in a long-continued series of experiments, he has observed that a magnetic action upon iron, when in a state of fusion, will produce the change alluded to, causing the small and closely-adhering grains to crystallise into coarse and larger grains, depriving it of its compact character; and it is inferred, that the action of heat upon axles employed in machinery, subjected to great velocity, will produce the same effect. This can only be prevented by diminishing the volume of axles in the iron, by carefully sweating the coal employed in melting, and, above all, by the use, in the manufacture of axles, of iron which has already undergone a partial change in its vitreous character, and which, on being reworked, is much less susceptible of crystalline change than new iron. Another recommendation on the same subject, by Colonel Aubert, was also read. He agrees with M. François as to the cause of the imperfection complained of, but appears to think that the only real prevention is, to change the axles employed in railway locomotives so frequently as not to give time for them to undergo the crystalline change, which is found to be so destructive.

**DEVON AND CORNWALL RAILWAY.**—A meeting of the Town Council of Plymouth was held on Tuesday, the 7th inst., for the purpose of entertaining the subject of the railway from Exeter to that town, and to determine how and in what manner so desirable an object could be promoted by the council in their corporate capacity. The meeting was adjourned to the ensuing week, to give time for the receipt of some additional information. On Wednesday last the adjourned meeting took place, when several important resolutions on the subject of the railway were passed; but as we have not received instructions to advertise them, we cannot notice them more particularly. The meeting finally arranged to commence a landing-place near the Royal Hotel.

**THE TARIFF.**—The late, the Commissioners of Customs have, with reference to the contemplated alteration in the timber duties, issued an order to their collectors and commissioners at ports where regular landing timber yards and ponds have not already been provided, directing them to acquiesce the merchants engaged in that trade that they are ready to receive applications as to temporary arrangements for landing colonial timber and other wood goods imported to the 15th of October next. This will enable the timber merchants to import cargoes previously, and hold them in bond, subject to the low rate of duty, if not taken out for home use before the proposed tariff increase law.

#### ORIGINAL CORRESPONDENCE.

##### "DAMMING" BACK WATER.

TO THE EDITOR OF THE MINING JOURNAL.

SIR,—Having lately had occasion to contend against a spring of water met with in Greenwood drifts, at the depth of thirty-six fathoms from the surface, I take the liberty of sending you an account of the method that was taken to dam it back.

**Underground plan.**  
The two drifts, A B, were each six feet wide and six feet high; a place, therefore, was selected where both coal and stone were sound, and the position of the dam prepared to suit the sweep of intended dam, a frame of oak, eight feet square, was then inserted, being carefully fitted to the chamber with tarred flannel, and the intermediate space filled with cast-iron segments, formerly intended for a nine-foot shaft, between each segment being filled up with slit deal for wedging in; the centre joints were also broken by inserting wooden plugs, also fitted for wedging. Inside the said dams were placed strong stays, to prevent the dams from wedging inwards; and in each dam was provided a men-hole 12 inches square, to allow the workmen to pass in and out during the process. A leaden pipe was also inserted from the top of the highest dam to the most elevated part of the drift, B, whereby to discharge the air whilst the space was filling with water. The dams being thoroughly wedged with wood at every joint, the wooden key-

Ev. of dam. pieces were drawn forward, and the space within gradually filled with water, discharging the air at the same time. At the end of twenty-four hours all was made tight, and the pressure allowed to take its course; the wedging has since been completed, and almost every leak stopped; therefore, taking the altitude at thirty fathoms, and each dam eight feet square, it gives a pressure of about 64 atmospheres, or 97 lbs. per square inch, being upwards of 400 tons against each dam. Each segment is 30 inches by 4, and three-quarter inch thick, with 2½ inch flanges.

**Newcastle-on-Tyne, May 2.**  
[Practical letters of this nature are at all times valuable, and will meet with ready insertion.]

**IMPROVEMENTS IN THE MANUFACTURE OF COPPER.**  
TO THE EDITOR OF THE MINING JOURNAL.

SIR,—In last Saturday's Journal you have given a specification of a patent granted to Mr. Duclos, of Clyde Wood Works, for an improved mode of smelting copper ores, and, after giving a detail of the processes, the article concludes as follows:—"The claim is to 'the mode of calcining the ores and fusing them in a blast-furnace, as before described; and also to the mode of separating the metals obtained in the treatment of the blast-furnace by liquation, as before described.'" Now, Sir, with regard to the first part of this claim, relating to the calcining of the ores in kilns, and afterwards smelting them in a blast-furnace, it is certainly not a new process, as in two separate smelting establishments with which I have been connected, and also in the one with which I am now connected, both these processes have been adopted for the last fourteen or fifteen years, and still continue to be pursued, so that I think Mr. Duclos cannot claim any originality in that part of his process; but as to mixing line with the ores, and also as to the evaporation of the metals afterwards, by what is termed liquation, as far as I am acquainted with the subject, it appears to me to be new. I have thought it right to put you in possession of these facts, to show that processes are sometimes thought to be new which have really been in use many years previously. How far this fact may tend to invalidate Mr. Duclos' patent I leave it to your better judgment to decide.

**A CORRESPONDENT.**  
Sheffield, June 13.

**NORTHERN COAL COMPANY—MR. FORSTER'S REPORTS.**  
TO THE EDITOR OF THE MINING JOURNAL.

SIR,—I am happy to find by your last week's paper that you have had the means of placing before the public the reports of the renowned Thomas Forster, more especially the one dated 1839, in which he has attempted to gulf the poor shareholders by his flaming estimates of the value of their concerns, leading them to believe that the worth of their very valuable property was somewhere about half a million sterling. It is difficult to conceive how a professional man of his stamp could calmly sit down to make such exaggerated statements and estimates as those given in his report; besides many of these statements are gross misrepresentations, which Thomas Forster must well have known to be such at the time of his concocting this report, for he was perfectly well acquainted and informed with the nature and extent of the several collieries. As instances of exaggeration and misrepresentation, he has put down the extent of some as upwards of 500 acres, which he must have known contained less than 200; others of two workable seams, of excellent quality, when he must have known by the borings, which he had, or ought to have had, contained only one; the depth is also exaggerated; others valued at between 17,000l. and 18,000l., which was suspended, and totally laid in after working less than a year, and which proved a losing concern to the company (and it is feared very few of the collieries belonging to the company are anything better than losing concerns). Many more instances might be enumerated, did time and space permit, but I trust you will do full credit to it when you come to comment on the report. What his motives could be in thus deluding his employers it is hard to determine, but we may fairly infer that they could only be of a mercenary nature, the fulfilment of which was to be realised from the sellers of the collieries. With such reports as those, well might the company be induced to purchase collieries where they were to be had at a few thousands less than what their value had estimated them at, thus giving the sellers an opportunity of quietly pocketing between 200,000l. and 300,000l. I may here add, those original vendors, with all their great spoil, are fast sinking into insignificance, a great portion of their treasure has taken to itself wing, and flown away, and they are left a by-word and a reproach to the good people of the north. I trust that you will shortly have occasion to offer some observations, as you promise, on the facts, as they now appear, in contradistinction to those Forster's powerful figures.

**Durham, June 14.**  
[Some comments on this communication will be found in another column.]

#### MINE SKETCHES—No. 1.

TO THE EDITOR OF THE MINING JOURNAL.

SIR,—The yet unwritten history of mines and mining, surviving in the memories of the living and the traditions of the dead, would be a most worthy task for your talented "correspondents," although neither of them may be, like myself, "a writer by trade." Brief continuous sketches (with anecdotes, &c.), numbered consecutively as the most interesting part of the history of one particular mine, would, doubtless, be very entertaining to most of your readers. It has occurred to the writer of this, that the subject of mine sets should be brought under the consideration of the mining public; and it would, perhaps, be desirable that the customs of particular localities should be exhibited, in order that increased facilities may be given to mining operations, so recently endangered by the proposed tariff. I will first describe the little I know of the present system, and then suggest a few hints for improvement. Some one thinks favourably of an old miner's stream, perhaps worked in the days of the Phoenician tin merchants—a tinmer or speculator looks a "keenly (kindly) question;" or should a dreamer dream a dream—a thirty brother sinks a pump—a "drowner" cuts a jointed barrel-and, and strikes east, west, north, and south, with all the self-importance of a regular John Bull, building a branch in each hand (and bent outwards)—or the adventures of an ad-jointing sett with to extend their workings—or some one desires to work a new sett through which a rich lode is known to run. I have heard of "drowners" having been blundered, and, for wages, finding poster-gets by holding the rod over them—but this may be a more put-house rumour. Certain it is, that holes have been fired by drowners; however, whether by an electrical or galvanic effect on the rod, or on the body of the man holding it with extended arms, this depends on myth not. But, on the whole, the discovery of a lode is one of the chapters of accidents, except by cross-cut—a two-angled mode of cutting parallel lodes. The first question is, "Is a fire, or drowner, or blunder?" for in this Drury of Cornwall are very many crises over which the Duke has no more authority, as to mines than the Pope of Rome. If blunder, the lode of the locality must be sacrificed, and a great for twelve months pursued if the lode is not worse to mining. When he is, however, speedily left unscathed, and the spot is sometimes granted; but what right have landowners to impound the appropriations of many centuries, to save the surface from a breach? The drowner are usually one-fourteenth, one six-

teenth, one-eighteenth; when mines are poor, drowners are reduced sometimes to prevent them from being "drowned." The lords who voted for the tariff will now, of course, be more liberal, at least till she pays cost. The Duchy lands are not distinguished by any public known accessible document, and the Duchy agent is often one of "the Great Unknowns." Tin bounds are supposed to be old setts renewed annually; as to boundaries and their agents, they may be anywhere between John O'Grat's and the Land's End; and after many a wild-goose chase, the dreamers and prayers for El Dorado find themselves minus their shoe-leather, ink, and paper, whilst liberty to work cannot be obtained by even "the golden image," in these days set up and exalted over all that is called man.

**Pennance, June 4.**  
**A. T. J. MARTIN.**

#### MINING IN IRELAND—KNOCKMAHON MINES.

TO THE EDITOR OF THE MINING JOURNAL.

SIR,—Your paper of the 31st ult. having fallen into my hands, I observed therein a letter from Waterford, signed "A Shareholder" in the Mining Company of Ireland—and a casual observer would suppose him to be one. Mr. Petherick's letter in the same paper, Sir, is straightforward and manly, and surely, if parties were inclined to be honest with him, and the public at large, they would not hesitate in avowing their real names. No impartial reader would give credit to the assertion of an anonymous writer, especially in a discussion of that kind; and I think, Mr. Editor, if you were to discourage those parties, by not inserting their communications unless their proper names were affixed, you would soon get rid of a useless correspondence.

"A Shareholder" cannot know much about the capabilities of the agent for whom he so kindly officiates, or he would not bring him into the field, but "keep him in the back ground." Does "A Shareholder" recollect his being at Ballydehob Mine, in the west of Ireland? If he does not, I can tell him something (so can Captain Pooley) that will not reflect much credit on him as a miner or a man of principle. It is all very fine to see a man's character and services highly coloured in a newspaper, but the best way of testing them is to come in contact with the man, and judge for yourself. I think that I hear the person who had that honour exclaiming, Surely it is an old apple-roman, not an agent of a mine! Your insertion of this in your next Journal will oblige an old miner, who knows something about the Irish mines, and your obedient servant.

**London, June 2.**  
**EDMUND PHILLIPS.**

[We must decline insertion of further correspondence on this subject, without it be a letter of explanation from Mr. Petherick, should he think fit to make any observations on the letters or remarks which have appeared in our columns.]

#### WATER-WHEELS.

TO THE EDITOR OF THE MINING JOURNAL.

SIR,—I am not for long letters. Saying as 2 is to 3 meant that a "fool's cap" was due to any pretender to exceed 40 per cent. I have given a practical trial to a wheel since writing you last, and am certain that no man can pump 200 gallons twenty feet high with a fifty-foot water-wheel, using 200 gallons to perform one revolution.

**Dublin, June 10.**  
**O. HARRLESS.**

#### MINERAL RESOURCES OF SOUTHERN INDIA.

In our last we briefly adverted to three important papers, submitted at a late meeting of the Royal Asiatic Society, by Lieut. Newbold, "On the Mineral Resources of Southern India," being the continuation of a series by that gentleman, abstracts of which have appeared in former Numbers of this Journal. The first of the papers now referred to was on the Gold Tracts; and in this, because of the importance of the object, the writer has cast a cursory glance over the vast extent of our Eastern territories where auriferous deposits are scattered, instead of confining himself wholly to Southern India; at the same time he has detailed only such localities as have not been mentioned by preceding observers. It is well ascertained that gold occurs in large deposits in our Indian possessions, from the Himalayas to Singapore, through an extent of above 2000 miles; and it is no less certain, that, so far as regards the application of European skill, they have been totally unexplored. Worked by the rude processes of the natives, many of them have yielded fair returns; though, it is true, that more have been deserted from their supposed poverty. Lieut. Newbold remarks, that this poverty is, more than probably, only external, and instantaneous the Ural Mines, which had been so long neglected on the plea of unproductiveness, but which, under the superintendence of experienced miners, now yield a large annual sum to the Russian Government. The first gold tract noticed is in the South Mahratta country, in a range called the Kuppul Gode, between 15° and 16° lat., and 75° and 76° long. The existence of this metal is not noticed by Christie in his paper on the geology of that part of the country. It was first brought to the notice of our Government by an interesting Brahmin youth, named Trimal Rao, who had been educated by the Rev. Dr. Wilson, of Bombay. This native visited the hills in March, 1839, with the object of fully exploring them. An account of his journey was given in the *Oriental Christian Spectator*, and specimens of various minerals were forwarded by him to Bombay. The gold dust was found in the bed of a rivulet near the village of Dauli, about two or three miles south of Dammul. Lieut. Newbold subsequently found gold dust in a rivulet to the south of Gaddah, and heard of its existence in other places in the neighbourhood. In all these places it is worked by natives, who proceed to the localities immediately after the fall of heavy rains, when it is found in considerable quantities, being washed down from its matrix in the hills. None is found in the dry season. One man, who employed three gold washers, informed Lieut. Newbold that he obtained four rapiers' worth in two days, and that he paid half of that sum to the washers as hire. The annual produce of three rivulets was estimated at 200 oz. of gold. Several other localities were described, and the processes followed by the natives detailed. The paper concluded with some suggestions as to the best mode of searching for the matrix whence the gold sands must be derived.

The next paper was on the Manganese Mines in the Kuppul Gode range, which the writer was induced to visit by the oral report of Trimal Rao, hoping to find coal there. The spot was a most sequestered one, surrounded by mountains covered with jungle, and far from any frequented tract. In spite of its situation, which seemed likely to keep it for ever unnoticed, the ore had been examined by the agents of Hyder and Tippu, who were probably as much disappointed as the writer himself. The discovery and exploration of so remote a spot, which had escaped the researches of Christie and Dr. Marshall, afford strong evidence of the activity of the Mohammedan monarchs of Mysore.

Lieut. Newbold was not aware of any other mines of lead in South India than those of the Eastern Ghats, between 14° and 17° lat., and 76° and 80° long. The principal excavations are between Cuddapah and Nellore. They appear to have been known in the times of Hindu dominion, before the Mohammedan Conquest, but have been long discontinued. The excavations now form a lurking place for the tiger, the leopard, the hyena, and other beasts of prey. Into one of these the writer descended, but, after ascending about thirty paces, was compelled to return by the oppressive state of the atmosphere. Portions of the ore brought home, and analysed by the society, contained 85 per cent. of sulphuret of lead. Lieut. Newbold is of opinion that these mines deserve examination by some competent European practically acquainted with the subject. Mines of corundum are worked about forty-five miles N. N. W. from Seringapatam, and in several other places in the Deccan. The name of this stone in the native language is Churud, from which, in all probability, the English term is derived. Some details of the mode of working were read, and an account given of the uses for which the natives employ the stone. Some of the mines appear to be rising considerably in value—a native having contracted for the sum of 150 pagodas for one year, while former times paid only 25 for the same term. The corundum is purchased at from 15 to 20 macees of 17 oz. each for 1 rupee. Fine rubies are found from time to time in the corundum hillside, and associated with it, particularly at Virallimooda and Shalagimooda. Garnets are pretty generally diffused throughout India. The finest specimens are found in the crystalline and metamorphic areas of Salem and Nellore, and sold at a low price by the native merchants. The beautiful variety called cinnamon stone is found in the Nellore hills in such abundance, that whole portions of rock are found almost exclusively of them. A valuable mine of precious garnets is worked near Gaddah, which has been described by Dr. Vauquelin in the *Asiatic Journal of Bengal*. These garnets are greatly valued by the miners, in which operation the lead ore is broken; all those which resist the blow are considered worthless.

**ANNIVERSARY RAILWAY.**—We understand it has been determined by Sir I. K. Brunel to adopt this new system of transit of the Thames Tunnel.



On Tuesday evening, the consideration of that part of the new tariff which affects a mutual trade, was entered upon in the House of Commons. The House having gone into committee, the CHAIRMAN read the following resolutions:—"That in lieu of all duties of Customs, payable on goods, wares, and merchandise, being the growth, produce, or manufacture of the United Kingdom, to foreign parts, there shall be levied the following duties outwards:—On coal, coke, or clinders, in foreign ships, &c. the ton."—Question put and agreed to.

Mr. Deas said he had entered, and should still enter, his protest--his most decided and unequivocal protest--against the principle of levying any duty whatever on the importation of raw wool, at the same time, after the Government had so far given way, in modifying their original proposition, he was not prepared to offer any opposition to the proposed proposition of her Majesty's Government. From a great anxiety, evinced by Sir R. Peel to protect every branch of the commercial interests of the country, induced him to form a confident hope that if this duty was found to operate injuriously upon our shipping or mining interests, no delay would occur in introducing a measure for its repeal.

Mr. LINDSAY vindicated Mr. Bell, and the other North of England Members, sitting in the conference, in the course which they had adopted, in acquiescing in the amended proposition of the Conference. He confessed, however, that he considered the great utility of *Conférences* worked with a view to the expansion of the movement of capital, and in machinery for them, and the large transfer of the proposition in the trade, he regarded the present proposal of the Government as *outraged* with anxiety. He therefore trusted that the Government would carefully watch the operation of the duty, and should find that a *monet* once lost was never recovered. Should such a result take place, the Government would have something to answer for; and he trusted that they then would not hesitate to acknowledge that they had acted erroneously.

Lord Macninch said, that it is extensive a series of changes as the tariff embraced it was not to be expected that all cases would be free from doubt but if there were one still in beyond every other respecting which there could be no possible certainty, he should say that that was the case with the coal duty. In support of the view of the duty in which he believed he desired to call the attention of the House to that which furnished him a remarkable shadow in the circumstances connected with the proposed duty—he suggested it as one of the most satisfactory elements which they were presented with reference to a

most extraordinary circumstances that ever occurred with reference to a proposition of this nature. It was well worthy of especial notice that the calculations of the men of science should have gone to support and strengthen the decision of the statesman without its having been possible for them to find any commensuration on the subject. While his right hon. friend at the head of Her Majesty's Government was submitting the bill now before the House, Mr. Buckland, the President of the Geological Society, delivered an anniversary address to the body of which he was the head. That address was read on the 11th February in the present year, and in the course of his remarks the learned president said that British coals were used for the purpose of working the machinery of foreign manufactures, which in certain cases could scarcely be maintained without a supply of British coals. In the year 1830, 1,431,000 tons were exported, and in 1840, 1,702,000 tons, of which nearly one-fourth went to France. Mr. Buckland further observed, that an imported coal on coals exported to any country exceeding one ton contains weight sufficient to afford a remedy. Besides the testimony of Mr. Buckland in support of the proposition of His Majesty's Government, some valuable evidence as to the probable supply of coal in the southern districts was given before a committee of the House, which sat in 1838. In that evidence were stated the number and extent of all the principal coal-beds. It set forth, that there is, Northumberland and Durham are two, and from those districts it has been ascertained that the coal in those counties will last ten years. Mr. Murray, in his Survey of Durham, states that was three of the coal being already got, the coal districts will be exhausted in 200 years. It is probable that other beds of inferior coal, which are now neglected, may be found to be worked, and the consumption of coal being greatly increased since Mr. Murray published his Survey of Durham, we may adjust his calculation to be an approximation to the truth, and that the coal of Northumberland and Durham will be exhausted in a period not greatly exceeding 100 years. This opinion coincides on the high authority of Mr. Buckland. Another learned gentleman was asked this question (May 21, 1850) "What do you think of the policy of permitting the exportation of coals to foreign parts from Northumberland and the counties?" It is something dangerous to conjecture the future of our own prosperity. An hon. Member here observed, that the supply of coal was calculated to last 100 years. That was the state of Mr. Thompson's and other testimony contributed to it was communicated to Mr. Thompson, Mr. Sturt, and to Mr. Buckland. The con-

Mr H. PEREY, replied that the income tax was secured, for the night's debate had shown what sort of chance he would have had for raising a revenue of four millions on articles of consumption. The present proposal was pretty generally supported by the coal trade, but that was asserted to be through compromise. No little, however, had he himself been aware of any such arrangement, that even so lately as on Saturday last, when he attended a meeting on this subject at the Board of Trade, he supposed himself perfectly free as to his own line, and knew not what course Mr. Bell, on the part of the coalowners, intended to take. But he could readily conceive that the coalowners, seeing the Government generally successful upon the other items of the tariff, would be very likely to come to the result they had arrived at, without anything like a compromise or bargain with the Government. Even if there had actually been a compromise, he could not think that such an arrangement, fairly made for the public, would have been open to blame. If that were inadmissible, to what purpose was it that the Board of Trade received deputations, and that the sense of parties interested in all branches of trade was communicated to Government? Now, as to the merits of this tax. Here was an article incapable of reproduction, and eminently abundant in England. Revenue being wanted, such an article was surely a fit one for an export duty. There had been a steady progressive increase in its exportation, for it was peculiarly suited for foreign manufacturers, and for the lighting of towns by gas. But then it was said that foreign states would be indignant at a duty raising prices upon their subjects. Why those states all raised a duty upon this very article themselves, as shown by the following statement:—

IMPORT DUTY ON COALS INTO  
s. d.

Hardly the foreigner was not entitled to have our commodity, and to get a revenue upon it, and to exclude us from taking any revenue upon it for ourselves. He trusted that, under all the circumstances of the Echequer and the country, the House would sanction the proposal of the Government.

Mr. C. BULLER differed in opinion from Lord J. Russell. He thought that it was an unwise policy to peril a great trade and large property for the paltry sum of about £40,000 of revenue.—On a division there appeared—  
For the Government proposition, 260; against it, 67.

After some conversation on the expediency of allowing a drawback on coal exported for use in British steam-vessels, and on some other points, the duties on the exportation of coal, clay and china stoneware, &c., were agreed to, and the remission improving the additional 5 per cent. of duty having been also agreed to, the long labour of the tariff was finished, Sir R. Peel expressing a hope, that as all the duties had been fully discussed, and as he intended that generally they should come into immediate operation, there would be no delay in passing the bill to be brought in.

All a consequence of the Royal Victoria Gallery, Manchester, on Wednesday week.

[illegible]

death by the chimney? Was it increased or diminished? Was the draught increased by your system? Was there greater or lesser concentration of heat in the chimney, or was it more evenly distributed along the flue? What means have you of ascertaining these several facts, beyond the appearance of the chimney top? Does your plan require any, and what, adjustment in the admission of air, by valve or otherwise? Does the fire require any particular mode of management? A series of such like questions could readily be framed, which would once test the merits of the several plans. Instead of such questions, the City is— "What saving will be effected?" Yet the amount of saving to be realized by any plan for effecting a more perfect combustion, depends on many different conditions.

and opens a wide and difficult subject. I call on any practical man to show the extent to which an improved system of combustion in the furnace refers to an improved system of generating steam in the boiler—for in this lies the main gain, and one that may well prove a reform. He is referred to the experimental furnace and boiler in Fennel Street, where, when the boiler was first brought on, a low narrow chimney, produced much smoke, and the evaporative power of the boiler was very low, but, on admitting air to the gases behind the bridge, the smoke was changed, and the gases, which had been converted into smoke, were now converted into flame, and gave much more heat and a greater amount of evaporation in the boiler, which still was low, as the boiler was unable to take up the heat generated in the furnace and flues. The mystery was thus at once solved, and the flue proved to lie with the boiler and not in the heat-generative faculty of the furnace, which appeared almost perfect. In this case, to remedy the evil under the old system, it was necessary to increase the quantity of *heat* given off, but, on the other hand, in question was on the new principle, that of increasing the economy of consumption of fuel, without materially increasing the evaporation—the flue being already filled with a current of heat beyond what the boiler could absorb. The economy of a new and enlarged boiler being impracticable, the only alternative lay in increasing the absorbing power of the flue surface, which was accomplished by the introduction of a series of connection pipes, and by this method the same quantity of water was evaporated in twenty-one minutes which had before required twenty-eight minutes, and from the same weight of fuel. Let the improved plans of Armstrong be taken up, and the greater quantity of *heat* they produce, and the boiler by the increased quantity of this heat, will be able to carry off the generation of steam, but let these two essentially different results be confounded, and the result will be a false estimate of heat generated. Mr. Williams explained the principle of his "thermo-meter," which he called *Styrpe's Pyrometer*. He then continued by stating, that, as far as belonged to the combustion of gases in thus preventing the generation of smoke, the eye alone was a sufficient guide, as it was in testing the process in the lamps before us; but, as regarded the quantity of *heat* generated, we must have recourse to other means. In small boilers the power of absorbing the increased quantity of heat that is made is the more difficult, from the limited absorbing surface of the boiler. A small boiler, of a given size, capable of evaporating 150 lbs. of water into steam in one hour, by 100 lbs. of fuel, would, by the application of an improved process, that an additional 50 per cent. of heat is generated, if the boiler be adequate to taking up the additional heat, 250 lbs. of water will be evaporated. Suppose, however, that from its limited extent of heating surface, or other cause, it was only able to take up one-half that additional heat—say, 25 per cent.—in such case the remaining twenty five per cent. would necessarily be lost by escaping through the chimney. Should we then be justified in estimating the economy of the new process of the furnaces by such measure of increased steam, and also estimating the other process, by the same, which would be a false estimate, or a better boiler, might have also turned to the account of evaporative power? After making a few remarks on forcing the *flue*, and reading some extracts from Tredgold's works, from which it appeared that his opinion was that smoke was inevitable, and that he had committed the error of saying that the flame was limited to six feet from coal and three feet from coke, he said, to use Mr. Williams's own words—"What would he have said, had he witnessed Mr. Parkes's late experiments on a marine boiler, in which the flame reached to forty feet, and in which the eye could not be deceived? What would he have said, if I showed him, as I daily do, a small boiler of two or three horse power, in which the furnace supplied with fuel alone, and never under ten feet in length? How are we to view this? But by the way—first, that he had not witnessed the proper combustion of the gases, which now produces flame, and that he had not adopted the means of looking into the furnace: That this latter would, however, have been useless without the former, is clear, as Mr. Parkes observes that he could not see a ray of light in the flues under the old system. Mr. Armstrong, following Tredgold, says in his Treatise, "we have never seen the flame go beyond the bottom of the boiler." I will show him the flame all round the boiler, as well as along the bottom; and I will do more—I will show the flame at the same time being rising from the bridge at the very moment, and under the exact state of things which we have seen in the furnace, and that, and that the admission of cold air behind the bridge, instead of actually producing flame, as it does, in fact, would so chill down the bottom of the boiler as to cause the plates to contract, and drag the rivets into holes. This is alleged by him to have occurred in Hamond's boiler, which he never saw in action, as there was no means for internal inspection. If it were so, how did it happen that the rivets and seams were also dragged all over the boiler, and even to the corner of the boiler? The importance of carrying the boiler and its heat-absorbing faculty, then, is fully exemplified in the Cornish boiler. By this means, and by a system of internal flues, the heat is directed in equal times a foot, after all, on this question of *flue* the whole depends. Economy is twofold, as to the fuel used and the time employed. The more active the combustion the greater will be the ratio of loss arising from the wrapping and unemployed heat; first, because the absorbing surface of the boilers are unable to take up all such additional heat in equal times; and, secondly, because the current or draught of the gaseous matter, carrying such heat through the flues, is also increased. If, then, in any given boiler, we require the largest quantity of water to be converted into steam from a pound of coal, and without reference to flues, or to the conversion of smoke into flame, we may say that the boiler is good, because such conversion produces more heat from the pound of fuel, but because it hinders the flues, with the nature of the absorbing faculty which the better plates possess. Now, this question of *flue* is overlooked in practice, though quite as essential in drawing an inference as the question of fuel used. A more perfect combustion may be profitably brought into action and rendered available by two means—viz., by extending the absorbing surface, or by increasing its heat absorbing and transmitting quality. He would, then, caution experimentalists, that, in calculating the general economy of any system of combustion in the furnace by the weight of water evaporated, and in making an inference as to the quantity lost by the chimney, and considering that quantity as equivalent to an equal quantity of heat, that the result of calculation would be deceptive in every sense. The following are the circumstances likely to interfere with the efficient action of both furnace and boiler—

*Causes Influencing the Quantity of Heat Generated*—1. The state of the atmosphere, 5, to 10 per cent. 2. The fire burning into holes, or unequally, and not so covered up, 5, to 10 per cent. 3. Irregular size of the coal lump, large and small, 7 to 10 per cent. 4. Inattention to removing the clinkers, 5, to 6 per cent. 5. Variations in the draught and use of the damper. 6. Quantity of air admitted, and mode of admission. 7. Quantity of *flue* surface. 8. Quantity of *flue* surface. 9. State of the flues—clean, or covered with soot. 10. Shape and size of the flues. 11. Mode of fire, or heat absorbing surface. 12. Quantity of escaping heat—that is, the rate of the current. 13. Temperature of the escaping heated matter by chimney. 14. Temperature in the flues. Again, what are the terms and circumstances which should enter into our calculation in estimating the value or effect of any system, or any particular boiler? They are—1. The weight of fuel employed. 2. The time taken for its combustion. 3. The quantity of heat generated. 4. The quantity of each heat absorbed by the water. 5. The quantity lost and escaping by the chimney—that is, the current. 6. The temperature of the escaping products. 7. The weight of water

Mr. Williams having completed his paper, proceeded to explain a coloured diagram, exhibiting a boiler and the fire beneath it for only half its length, the rest of the boiler being heated by the smoke. By means of a strip of parchment, he showed the changed appearance produced as in his experiments, at different points along the grate—namely, a bright clear flame, or rather white heated matter, extending throughout the whole fire, as seen by means of eight holes, formed of iron tubes, inserted in the end of the furnace, or flue, at the opposite extremity to the door. In the case of the marine-boiler experiments by Mr. Parkes, at times as much as forty feet of the flue were filled with flame, and twelve feet of flame was the minimum. The same from one alone was never less than ten feet long, and it became nearly four when the fire was urged. He next exhibited a table, calculating the heat given off by a ton of coal burnt in the grate, and the quantity of water evaporated by a marine boiler at Liverpool, during the whole year. The table exhibited the results of three experiments—No. 1, on a furnace with quick combustion, on the old system of boring as much upon the grate as possible; No. 2, quick combustion, on the new (Mr. Williams's) system; and No. 3, slow combustion, on the new system. The surface of the grate was seven and a half feet in length; the flue was five feet six inches in length, with five feet of surface. In the experiment No. 1, 124 lbs. of fuel were burned in one hour, and 610 lbs. of water evaporated, or concentrated into steam, bringing equal to 4 lbs. 7½ oz. of water per pound of coal. The mean heat of the steam was 280°; and the lowest temperature of the flue was 198°. In the second experiment, taking the coal at 14 lbs. per ton, was 48 lbs. On that day the whole of the fire was dark; there was no possibility of seeing a single ray of light the while of day. The experiment was carried on with great care the whole day. The second every thing like the same as to the boiler and furnace, with the exception of leaving the air an entrance through the perforated box, and with the same mean experiment No. 2, 224 lbs. of coal were actually consumed in one hour, instead of 124 lbs., evaporating 174 lbs. of water, which was equal to 7 lbs. 12 oz. of water per pound of coal. The mean temperature of the flue was 198°, and 138° respectively, and was exactly the same as in the first experiment. In the third experiment, in order to elude the plan of slow combustion, a large quantity of fuel was put on, upon the plan recommended by Mr. Parkes, and 4 lbs. of coal only were employed in the hour, yet the quantity of water evaporated was raised from 17½ lb. to 198 lbs., so that the economy was actually increased; and the slower the combustion is, the more heat and the more water was evaporated per pound of coal—consuming, in this instance, 48 lbs. of coal. The mean heat of the flue was 198°, and the heat occupying 16½". But the question of time must still remain. Exactly the same procedure took place, either a longer trial, or a shorter trial, apparently according to the convenience of the witnesses, but he did not get through the trial in the time, and got this day the engine did not go on its day—whereas it had before.

A stranger would say—"Give me this plan of slow combustion, the fuel of evaporating 198 lbs. of water, the coal at 14 lbs. the ton, is only 48 lb., instead of 124 lb. the cost is 28s. 6d.; here is economy?" His answer was—"So I will give you this plan, if you will be satisfied with this quantity of steam." It depends entirely on the quantity of steam wanted per pound of coal, and not on the quantity of steam evaporated with a certain quantity of fuel. This experiment has been repeated several times, and he believed that the same result could be obtained on any compensated per pound of coal, at an expense of 10s. but he retained the steam in the same ratio. Thus, in his opinion, was the mode, to which he referred of attention should be turned, and not solely by the quantity of heat given out in stages of steam.—Mr. Williams then applied the proposition to an Argand burner, when the latter seemed suited distinctly, indicating a considerable rise in temperature. As it gradually cooled, the latter returned, and Mr. Williams observed a better blowing on it produced a remarkable effect in contracting the metal, as shown by the expansion of the metal. The source of this phenomenon, the flames, did not escape into his hands. If the current of air does not blow away the gas, or whether the stream was in itself, it would depend on the force of the wind was something wrong—that the fire was too loose, &c.

was interestingly wrong, and the fact was not known, and  
 (demonstrated then) contrary, in which Professor William Phillips, Messrs. F. Clay,  
 (retiring), Washington, D.C., George, Jordan, the Chairman, and Mr. W. H. H. H.  
 a part. On the motion of Mr. Clay, the thanks of the meeting were voted to  
 William for his valuable contribution, as well as for the series of interesting  
 remarks on the subject, which he had laid before the gallery, and, thereby, he  
 was the public of Washington.



## PROCEEDINGS OF PUBLIC COMPANIES.

## COLOMBIAN MINING ASSOCIATION.

The annual general meeting of the proprietors of this company was held on Thursday, the 15th inst., at the offices of the company, Austinians.

G. D. POWELL, Esq., in the chair.

The advertisement convening the meeting having been read, the CHAIRMAN submitted the directors' report, as follows:—

## REPORT.

The directors have now to lay before the proprietors a report of the proceedings of the company during the past year. They have to regret that it will not be so complete as they could desire, owing to the great interruption which has occurred in the internal communications of New Granada, arising from the insurrection which broke out in that country in the latter part of 1845. From January, 1846, to February, 1847, the River Magdalena, the main channel of communication between the coast and the interior, was closed by the insurgent party, and all intercourse with the capital, except by very circuitous routes, suspended. On the 24th of February last, however, a complete pacification was effected on the coast, and the ordinary channels of communication were, doubtless, immediately resumed.

Suria District.—It was stated in the last report that the prospects in this district seemed to be improving, and to afford a hope that the operations of 1846 might prove a profit. This expectation has, to some extent, been realized, so far as the silver has been received. The balance against the Suria Mines in the balance-sheet of last year was \$400,119. In the present it is \$600,119, showing an improvement therein of \$200,000. The directors are unable to state the exact quantity of silver produced in 1846, the returns for September and December not having been received from the mines, and not being responsible for any amount of cost which may be incurred over and above the realized value of produce, unless such excess of expenditure shall be expressly authorized by them or their agents in Bogota.

It would have been very gratifying to the directors if they could have announced that, which they are aware can now alone give satisfaction to the proprietors—the declaration of a dividend from the produce of the mines. It is not in their power to do so. Some profit has been made in the past year, and the concern is so far in a better position than it was at the last annual meeting, but the amount of profit must be on a larger scale to be sensibly felt by the proprietors. The superintendent of the Suria District, Mr. Degenhardt, is full of confidence in the capabilities and the resources which he sees around him. He has not made good his estimate of produce for the past year within about 12 per cent. In so far as this has been occasioned by the want of hands, arising from the dispersion of part of his people by the political disturbances, Mr. Degenhardt cannot be responsible for the deficiency. But it has too often been experienced in this and other like undertakings, that, when success might reasonably have been looked for, some interruption or hindrance has arisen from some quarter or other where it was not expected. With respect to political disturbances in the country, the directors are bound to own that, except such as has arisen indirectly from the nature of these disturbances—the resorting for troops occasioning the natives to desert their ordinary occupations, and the communications being, in some parts, interrupted; but the company's property, and the Europeans in its service, have always been respected by all parties. If it had happened that Mr. Degenhardt had realized a larger produce at his district of 12 per cent., it would, undoubtedly, have been sensibly felt, as the increase would have been attended with little proportionate expense. The object of reducing the loss sustained at Maricao, in the extraction of the precious metals from the ore, has been long and carefully considered, various experiments and methods have been tried, and are still in progress, with this view. The directors hope that some thing has been effected in this way, and they trust still more will be done, it being clear that, if it were by any means practicable to extract the whole, or nearly the whole, of the precious metals, the Suria District would, for some time past, have been leaving a considerable profit. An opportunity having occurred for Mr. Chapman, the secretary of the company, paying a visit to New Granada, without expense to the company, the directors have readily availed themselves of it, in order that Mr. Chapman might visit the company's two establishments there. He left England in April last for this purpose, and the directors expect that he will be able to visit the Pamplona establishment in the present month of June.

The accounts submitted showed the total expenditure, since the commencement of the company, had been above \$1,000,000, of which amount \$2,700,000 had been expended on the mines in Colombia, and \$4,500,000 upon the Pamplona mines. The reserve fund, invested in the 3 per cent. Consols, amounts to \$250,000. The total amount raised by shares amounts to \$400,000, and by loan \$100,000.

The CHAIRMAN said, the next business was the election of directors, and, as Mr. Wilkins did not wish to be re-elected, the directors proposed that the number should be reduced from seven to five.—It was then moved, seconded, and carried unanimously.—That Mr. McDonald and Mr. Alderman Thompson be re-elected directors, and Messrs. Donaldson and Ewhand auditors, for the ensuing year.—The CHAIRMAN stated, that the Debt of Settlement originally required that there should be not less than twelve directors, which number was afterwards reduced to seven. It was now proposed that the number should be reduced to five—three to be a quorum.—A motion to that effect was accordingly carried unanimously, but another meeting will be required to confirm the same.

Some conversation ensued respecting the future prospects of the company, which appeared much better than for some time past. The company had now let out the mines in Pamplona, which used to swallow up the profits made in Suria.—In reply to a proprietor, a DIRECTOR observed, that, in the monthly gold returns, from \$5 lbs. to 20 lbs. of fine gold might be set down as the average expenditure, and all above that amount would be profit; the value of the pound of fine gold was here about \$100., or about about \$143.—After some further conversation the meeting adjourned.

## WEST WHEEL JEWEL MINING ASSOCIATION.

At a special general meeting of the proprietors of the above company, held at the offices, 23, Threadneedle-street, on Wednesday, the 15th inst.,

J. HERON, Esq., in the chair.

It was moved by Mr. MOUNT, seconded by Mr. TREWKY, and carried unanimously.—That the resolution passed at the special general meeting, held on the 25th ult., for increasing the capital of the association to the extent of \$1 per share upon the existing number of 2045 shares, be hereby confirmed.—The meeting then adjourned.

## MINING CORRESPONDENCE.

## ENGLISH MINES.

## HOLMURCH MINING COMPANY.

June 13.—I beg leave to inform you that the lode in the 110 fathom level west is still about eight inches wide, with stoness of ore. The lode in the 100 fathom level west is ten inches wide, and worth 7½ per fathom; in this level east we are driving south to intersect another part of the lode; the lode in the eastern slopes, in the back of this level, is eighteen inches wide, and worth 3½ per fathom; the lode in the western slopes, in the back of ditto, is eighteen inches wide, and worth 4½ per fathom. In the nine y fathom level west the lode is still about eighteen inches wide, and worth 3½ per fathom; the lode in the eastern slopes, in the back of this level, is eighteen inches wide, and worth 3½ per fathom; the lode in the middle slopes, in the back of this level, is fifteen inches wide, and worth 3½ per fathom; the lode in the western slopes, in the back of ditto, is sixteen inches wide, and worth 3½ per fathom. The lode in the eighty fathom level east is one foot wide, and intersected with ore; the cross-cut at this level to the north lode is still progressing in favourable ground; the lode in the slopes, in the back of this level, is fourteen inches wide, and worth 3½ per fathom. The sixty-two fathom level east is without alteration; the sixty-two fathom level west is suspended, and the back set on tribble at 10 in. the 11. The tribble pithead, upon the whole, are still looking favourable.

F. PHILLIPS.

## TREGOLAN MINING COMPANY.

June 13.—We are progressing favourably with the sinking of Butler's shaft, which is now down six fathoms below the forty fathom level; we have carried but little of the lode in sinking latterly, consequently I cannot at present inform you of what it is chiefly composed. We have commenced sinking a new shaft below the forty fathom level, about twenty fathoms to the east of Butler's shaft, where the lode is of a very favourable description, producing grey ore, and worth about 18½ per fathom. We have succeeded in sinking the main lode in the cross-cut going south, at the forty fathom level, which is about two feet wide, chiefly composed of grey, black, and granitic, with specks of yellow ore, which I consider to be a kindly lode. We have commenced driving east on its course; the ground is favourable. The south part of the Mine-park lode, on which we are now driving, at the forty fathom level going east, is unproductive.

J. NICHOLS.

## TREGOLAN MINING COMPANY.

June 11.—At Chester shaft no lode has been taken down. The seventy-west is two feet wide, nearly all granitic, with a quantity of water issuing from it. At the seventy-east an amount has been driven. The sixty-west is intersected by a tribble. The sixty-east is worth 10½ per fathom. The fifty-west is worth 7½ per fathom; and the whole under is worth 10½ per fathom. Gauden's shaft is down below the twenty about nine fathoms. Good Fortune shaft is down 6½ per fathom in sinking. The forty-four east is worth 10½ per fathom, but in the thirty-four there is not much ore. The tribble pithead throughout are looking very well.

W. STUBBS.

## TREGOLAN MINING COMPANY.

June 13.—The lode in the forty fathom level, east of engine-shaft, is eight inches wide, and producing some ore. The lode in Williams's shaft, sinking under the thirty fathom level, is six inches wide—tribble ground. The lode in the thirty fathom level, east of Heawood's shaft, is six inches wide—unproductive. Tregollan's lode, at the thirty fathom level, east of John's shaft, is eight inches wide, producing some ore. The north part of the Mine-park lode, east of John's shaft, at the twenty fathom level, is one foot wide—unproductive. John's lode, east of John's shaft, at the ten fathom level, is four inches wide—tribble ground. The Mine-park lode, at the adit, east of Morcom's shaft, is one foot wide—unproductive.

H. WILLIAMS. J. MORCOM.

## UNITED HILLS MINING COMPANY.

June 14.—Williams's Shaft.—No lode broken in this shaft for the past week. Sixty Fathom Level.—In the eastern end of this level the lode is four feet wide, and improved for ore since last reported; in the western end the lode is five feet wide, producing some stoness of ore. Fifty Fathom Level, east of Eastern Shaft.—The lode is eighteen inches wide, one foot producing ore; at the stopes, back of ditto, the lode is two feet wide, and very good for ore; east of James's shaft the lode is two and a half feet wide, eighteen inches on the south part producing some good ore. Diagonal and Eastern Shafts.—In the eastern shaft the lode is three feet wide, one foot on the north part is producing ore of a fair quality; there has been no lode broken in the diagonal shaft since survey day. Forty-six Fathom Level.—We can report no alteration in either of these shafts since last reported. Forty Fathom Level.—In the eastern end the lode is two feet wide, six inches on the north part good for ore. Thirty Fathom Level.—The lode in this end is one foot wide, occasionally producing good stoness of ore; in the western end the lode is one foot wide, at present with but little ore. Twenty Fathom Level.—In this shaft the lode is small, and producing a small quantity of ore.

N. LANGDON.

## WEST WHEEL JEWEL MINING ASSOCIATION.

June 13.—The seventy-east on the south branch is more promising in its appearance for ore. At the seventy-east, on Wheel Jewel level, the lode is eighteen inches wide, principally yellow ore, worth 15½ per fathom. The fifty-seven east on this lode is worth 16½ per fathom; and in the mine, under this level, the lode is worth 15½ per fathom. The fifty-seven east on Buckingham's is more promising; and in the cross-cut, driving south on the little cross-course, we expect we are near the lode on the other side.

S. LEAN.

## TAMAR SILVER-LEAD MINING COMPANY.

June 13.—In the 125 fathom level the lode is about one foot wide, producing a small quantity of ore. In the 115 fathom level the lode is just the same width, good saving work. In the 105 fathom level the lode is from nine inches to one foot wide, composed of rapel, fluor-spar, and silver-lead ore. In the ninety-five and we appear to be nearly through the silty ground; the lode is again forming itself, but as yet poor. In the eighty-five fathom level the lode is one foot in width, carrying a good leader of ore. In the sixty-five fathom level the lode is small and poor. The fifty-five fathom level is still in silty ground; and in the forty-five fathom level the lode is three feet wide, producing good work, and promising. In the thirty-five fathom level the lode is eighteen inches in width, producing a little ore. At the north mine the work is all in a forward state.

J. SPRAGUE.

## FOREIGN MINES.

## IMPERIAL BRAZILIAN MINING ASSOCIATION.

Gold Report.—Gold raised from the 5th of March to the 24th (seventeen days), 20 lbs. 5 os. 9 dwts. 10 grs.—Total, from the 1st of January to the 24th of March, 153 lbs. 1 oz. 4 dwts. 10 grs.

## BRAZILIAN COMPANY.

Cata Branca, March 15.—The various works go steadily forward, and I think this week will complete matters enough to enable the new pumping-wheel, by means of a chain, to assist the old engine, and keep the bottom clear of water. You will see that the gold return shows a little improvement. Indeed, badly, apparently, as this year has commenced, it already exhibits some gain over the last to the same period. I am sorry to say that we are just beginning to feel the ill effects which always, to a greater or less extent, accompany the change of season here. An influenza attacked us yesterday, and the number on the sick list to-day is eighty. There are as yet no serious cases, and our surgeon does not anticipate more than temporary inconvenience from it.

W. CORNWORTH.

March 25.—Captain Cornworth left for Conceicao on the 20th instant. In consequence of not being able to keep the water in tank in the mine, the stamps have fallen very short of stuff this week. However, to-morrow will, I trust, see the new pumping-engine at work, and the evil thus remedied. The sick list is, I am happy to say, reduced.

March 30.—I informed you in my last of my anticipation of the new pumping engine going to work on the 25th instant. In this, however, I have been disappointed, in consequence of an unforeseen difficulty, which will occupy us yet two days. The small quantity of ore sent out of the mine, owing to the causes formerly mentioned, added to the holidays, will cause the gold return for this week to be very low.

W. T. GRIFFITHS.

Gold return for three weeks to 25th March, 52 lbs. 1 oz. 1 dwts. 10 grs.

## ST. JOHN DEL REY MINING COMPANY.

March 19.—Average number of hands working eighteen days, 50. Mines.—Sinking continued in the Bahu and Gamba, Champion being lengthened west. The old level in this mine, alluded to in our last, has been cleared out; it was driven seven feet. Monthly cost for February, 14,061 re. 915. Water.—Yesterday the Bahu was at low-water mark. It has rained hard all day, the freshet is increased, and there are 6 ft. 6 in. water tanked. The Bahu is full. Arrastre.—The sand ground will be unamalgamated to-morrow, and its contents included in the returns for March. Surface Works.—Mason's party employed on dam. Another ladder is being prepared to lay down here, one not being sufficient to carry the waters off during freshets.

## COLOMBIAN MINING ASSOCIATION.

Maricao, Feb. 17.—Mellon Level South.—It is pleasing to know that this level has intersected, in the direction pointed out by Mr. William Degenhardt, the deposit of ore as stated in the correct section of this lode made by Mr. Walker. There are now some hundreds of tons of ore at command in this station, which may be broken and extracted, say, for \$3 per ton; and, judging from the favourable result obtained by washing a sample of the ore now on the surface, it will contain about 14 os. fine gold per ton, if assayed. This lode will, for the present, appear under the name of South Gamba.

Gambura Cross-cut South.—We have also been so fortunate as to intersect the North Salto in the company's boundary with this cross-cut yesterday; and although the lode is found small at this point of intersection, there are 2000 tons of ore at immediate command from this lode in the back of this cross-cut, according to Mr. W. Degenhardt's calculation, and which I believe is to the point. Mellon north level, extended on the Gambura north lode, has a lode of enormous width in its present end; but the ore is rather caducous and poor—a circumstance which has also been pointed out at an early time by Mr. Walker, and which proves to be correct. These are the most favourable and important alterations that have taken place during the last few days in the mine; the remainder of the stations are continuing as usual, and most favourably, on the Candela lode, which at present is almost entirely penetrated only in the Candela register.

March 2.—Prospects of this Establishment.—In my letter of the 7th January, 1846, I stated that no exertion of mine should be wanting in endeavouring to restore prosperity to the company, and to repay the shareholders with a regular dividend, which they fairly deserved, for their faithful support of this establishment. Two years have elapsed since that time, and nothing material has been effected towards this most of all desirable objects, owing to causes which were out of my control, although great obstacles have nevertheless been conquered, and many more are yet required to be surmounted in the erection of stamps, complete, opening and the different mines, and, above all, in procuring sufficient salaries for the various departments, and the shareholders may safely expect a satisfactory dividend from the beginning of next year—at least, such is warranted by the prospects of the mine in its several stations, which are now required to be carried on vigorously and economically. During February, only 47 tons of rough ore have been stamped, owing to the insufficiency of stamps and the dry season, the water having fallen off very considerably; it is expected they will produce 20 lbs. fine gold.

Maricao Report for January.

Summary of Ore.—During January, 100 1/2 tons of ore have been concentrated on the different levels, and produced 720 lbs. of ore.

North Salto Fourth Rise.—The communication with this and the old level, seven and a half fathoms above the San José cross-cut, is made. The air now is good, and the party ordered to drive the North Salto and further west, and after driving three feet, we met again with a promising branch of ore, which now has improved to four feet clear ore, and is free for breaking. At present there are in operation three shafts on the North Salto, in an horizon with the San José cut. The first and the third are to the east of the cross-cut, the second to the west of it; in all of them are promising bunches of ore. The distance from the first to the third is eight fathoms, and from the first to the second twelve fathoms—making a total distance of twenty fathoms. The first shaft is already fourteen fathoms deep, and the ore in it is averaging thirty-six inches; by sinking this shaft six feet deeper we shall reach the horizon of the North Gamba cross-cut shaft, which cross-cut I expect will cut in a few days the North Salto main lode. The height from this cross-cut to the North Salto level amounts to fifteen fathoms, the distance from the three winzes to twenty fathoms—making 300 square fathoms of ground, which 300 square fathoms will produce at least four tons of ore on an average, making a total amount of 1200 tons; and the lode east of the third shaft, and west of the second shaft, is equally good.

Gambura Extraction Level, Bottom Stage.—The ore is good, but the air very bad; free for breaking, and nearly five feet wide. After a ventilation is effected, we may obtain from this quarter a great quantity of ore.

Mellon South Level.—The lode is cut with this level, and appears of a good nature; I think we shall effect the communication soon with the old workings, a little above, as previously stated. The Candela deep sill cross-cut north is recommenced; the ground, although harder, will, I think, improve soon.

[To be concluded in our next.]

## WORK PERFORMED BY STEAM-ENGINES.

IN MAY, 1845.

Taken from the official duty paper of Mr. THOMAS LEAN, of Maricao, Cornwall.

s stands for single; d for double; in, for inches.

Mines.	Engines.	Stroke in cylinder.	Lead per stroke in ft.	No. of strokes p. min.	Quantity of steam in cu. ft.	Pounds lifted 1 foot high by a bushel of coal.	Average quan. of water p. min.
W. Darlington	Eastern 80 in. s	16.0	12.1	7.07	94 lbs.	58,001,701	1075.02
Ditto	Halton's 80 in. s	16.0	12.34	6.14	9274	45,417,775	—
Gr. W. Fortuna	G. W. Fort. 80 in. s	16.0	12.34	6.14	9274	45,417,775	—
Ditto	Wh. Pros. 80 in. s	16.0	12.34	6.14	9274	45,417,775	—
Ditto	Wh. Friends. 70 s	16.0	12.34	6.14	9274	45,417,775	—
Providence	80 in. s	16.0	12.34	6.14	9274	45,417,775	—
Wheel Virgin	Taylor's 60 in. s	16.0	12.1	6.07	900	50,150,122	104.5
Ditto	Vincent's 80 in. s	16.0	12.1	6.07	900	50,150,122	104.5
Reliance	80 in. s	16.0	12.1	6.07	900	50,150,122	104.5
Carlisle Cons.	70 in. s	16.0	12.1	6.07	900	50,150,122	104.5
Wheel Julia	80 in. s	16.0	12.1	6.07	900	50,150,122	104.5
Ding-dong	80 in. s	16.0	12.1	6.07	900	50,150,122	104.5
Levant	New 40 in. s	16.0	11.1	5.9	724	39,370,000	74.4
Ballinacree	30 in. s	16.0	11.1	5.9	724	39,370,000	74.4
Ballinacree	24 in. s	16.0	10.3	6.3	170	38,000,117	101.1
Goldolphin	80 in. s	16.0	10.3	6.3	170	38,000,117	101.1
Ditto	Sims's 80 in. s	16.0	11.1	7.9	990	78,000,153	1005.50
Ditto	Roberts' 80 in. s	16.0	10.9	6.35	1000	78,000,153	1005.50
Great Work	W. Breage 60 in. s	16.0	8.5	8.35	74	38,003,047	—
Ditto	Lead's 60 in. s	16.0	14.69	7.69	144	38,003,047	1005.12
Wheel Vor	Borlase's 80 in. s	16.0	10.9	6.74	800	78,750,816	—
Ditto	Trotway's 80 in. s	16.0	10.9	6.74	800	78,750,816	—
Ditto	Wood's 80 in. s	16.0	10.9	6.74	800	78,750,816	1005.9
Ditto	Penhall's 80 in. s	16.0	10.9	6.74	800	78,750,816	1005.9
Ditto	40 in. s	16.0	10.9	6.74	800	78,750,816	1005.9
Treawas	40 in. s	16.0	10.9	6.74	800	78,750,816	1005.9
Dunstanville	40 in. s	16.0	10.9	6.74	800	78,750,816	1005.9
South Rookery	W. Chance 60 in. s	16.0	6.7	4.3	1152	35,192,400	114.4
North Rookery	New eng. 70 in. s	16.0	10.4	5.7	1200	67,010,940	379.9
R. W. Croft	Treawas 60 in. s	16.0	11.1	4.9	1000	77,903,000	930.4
Ditto	Dunstan 80 in. s	16.0	13.9	—	—	—	—
Belcoath	70 in. s	16.0	10.39	4.1	1716	36,015,390	104.0
Wheel Jewel	80 in. s	16.0	13.9	4.9	1000	66,367,700	81.8
Polkton	Sims's 80 in. s	16.0	7.14	9.9	3504	46,900,510	916.6
U. Wood	Williams' 80 in. s	16.0	7.14	9.9	3504	46,900,510	916.6
Hallinacree	Vic's 70 in. s	16.0	7.14	7.4	1894	38,308,110	1001.2
Ditto	Bowen 80 in. s	16.0	11.9	7.5	1001	33,671,754	—
W. Beauchamp	Western 80 in. s	16.0	7.75	—	—	—	—
Ditto	Powling's 80 in. s	16.0	10.3	7.4	1900	58,009,010	918.0
Wheel Ury	70 in. s	16.0	7.47	6.3	1743	44,951,737	847.4
Cara Bros.	70 in. s	16.0	14.93	4.1	820	33,999,300	437.9
Ditto	Sims 50 in. c. s	16.0	12.07	3.9	100	37,995,533	—
Tinctor	40 in. s	16.0	13.30	3.69	100	24,997,437	100.4
East Pool	80 in. s	16.0	13.3	3.4	478	19,997,437	100.4
S. W. Bassett	40 in. s	16.0	13.3	3.4	478	19,997,437	100.4
United Mines	Taylor's 55 in. s	16.0	11.05	6.0	1200	37,103,700	—
Ditto	Carden's 50 in. s	16.0	12.74	3.70	1000	39,993,747	—
Ditto	Edison's 50 in. s	16.0	10.9	6.3	507	40,000,700	1000.9
Ditto	Loam's 50 in. s	16.0	13.3	3.9	1004	31,011,822	—
Ditto	Hocking's 50 in. s	16.0	10.4	6.0	8332	70,003,704	—
Brown Bridge	20 in. s	16.0	9.3	—	—	—	—
S. W. Treawas	70 in. s	16.0	9.7	6.9	9100	55,946,708	405.8
United Hills	Williams' 80 in. s	16.0	9.14	10.3	1000	70,015,010	601.9
Ditto	Old 80 in. s	16.0	13.3	3.3	1100	60,000,000	—
Polkton	80 in. s	16.0	13.3	3.3	1100	60,000,000	—
Ditto	Vic's 70 in. s	16.0	15.2	6.9	1338	60,000,000	478.4
R. Wheel Rookery	80 in. s	16.0	10.9	7.0	1001	51,013,308	1006.4
W. F. Chance	Union 40 in. s	16.0	13.3	4.3	1100	54,000,000	171.1
W. F. Chance	Austen's 80 in. s	16.0	10.03	—	—	—	—
G. W	60 in. s	16.0	13.57	3.8	1000	60,745,332	693.3



## THE NEW TARIFF—THE COAL TRADE.

On Tuesday evening, the consideration of that part of the new tariff which relates to our coal trade, was entered upon in the House of Commons. The Hon. Mr. Stansfeld, in a committee, the CHAIRMAN read the following resolution:—"That in lieu of all duties of Customs, payable on goods, wares, and merchandise, being the growth, produce, or manufacture of the United Kingdom, to foreign parts, there shall be levied the following duties on imports:—On Coal, culm, or cinders, in foreign ships, 4s. the ton."—Question put and agreed to.

On the question that, "on coal in British ships, not being small coal, 3s. the ton," being put, the CHANCELLOR OF THE EXCHEQUER said that the original intention of Government was to propose a duty of 4s. per ton, from which they anticipated a revenue of £300,000; but, having, on consideration of the interests involved, altered their intention, the anticipated revenue would probably be reduced by 60,000*l.*, which, however, he hoped would be compensated by increased exportation. The cause of the Government suggesting this tax, in the first instance, was, that foreign nations required on coal, to enable them to carry on their manufactures, and, at the same time levied a duty upon its importation to secure the purposes of their own revenue; it, therefore, appeared to the Government, that if we gave foreigners the advantage of importing our coal, and, at the same time, of deriving a revenue from it, it might not unfairly be made a subject of consideration, whether, without injury to our own interests, we might not ourselves derive some advantage by levying a duty upon its exportation. One important consideration, which had chiefly induced them to modify their original proposition, was that which arose out of the state of steam navigation in this country. It was represented to Government, by those connected with the steam companies, that such a duty would be a burden which companies having depôts of coals in foreign countries would not be able to bear, and from which, if imposed, they must devise means to obtain exemption; and it appeared to those most acquainted with matters of revenue, that it would be impossible for the Government to take any measures to secure them such exemptions, without opening the door to the commission of great frauds. It, therefore, appeared desirable that such a duty should be imposed as might at once be fairly borne by the trade, and so supersede the necessity for creating any system of drawback liable to evasion. The Government believed that the 2s. duty now proposed was one which would not so affect the price of coals in any part of Europe as materially to diminish the demand, and that they might assume that the quantity to be exported for the future would bear the same proportion as during previous years. Taking, therefore, 45,000 tons of coal to be exported in foreign ships at the 4s. duty, they would have a produce of 18,000*l.* From 25,000 tons exported in British ships they would have 100,000*l.*; and, taking the small coal sent abroad at 475,000 tons (a quantity somewhat larger than was exported last year), they would obtain 20,000*l.*—making up a total amount of 140,000*l.*, being a deduction certainly of 60,000*l.* from the gross amount originally contemplated, but from which gross amount they would have had to deduct the loss to be sustained by the diminished exportation under the higher rate of duty, and the loss by reason of the drawback, and the evasion to which that drawback would have given rise. The result, therefore, would be a diminution in the receipt from this duty amounting to 60,000*l.*; but, on the other hand, the House would be relieved from all anxiety as to the effect of the duty on exportation upon our own trade, whilst in foreign countries the extra duty here would have the effect of adding but a very small amount to the present price.

Mr. RUSSELL said he had entered, and should still enter, his protest—his most decided and unequivocal protest—against the principle of levying any duty whatever on the exportation of coal; but, at the same time, after the Government had so far gone in modifying their original proposition, he was not prepared to offer any opposition to the present proposition of her Majesty's Government. From the great anxiety evinced by Sir R. Peel to protect every branch of the commercial interests of the country, induced him to form a confident hope that if this duty was found to operate injuriously upon our shipping or mining interests, no delay would occur in introducing a measure for its repeal.

Lord HOWICK read various documents relating to the negotiations of the coalowners with the Government, which ended in their obtaining this compromise, as a condition of their foregoing their threatened opposition. Small as the amount of this diminished import might appear, it would materially affect our export trade in coals, which was at present exposed to a competition that threatened our hold of the Mediterranean and continental markets. Besides, the distinction between round and small coals, in levying the tax, would lead to an additional amount of Custom-house supervision, which would materially diminish the produce of the tax, while it would inflict an amount of inconvenience and annoyance in the foreign trade in coals, which would interfere with it to a most injurious extent. As to the argument, that our coals were enabling our foreign manufacturing rivals to compete with us, how did that agree with the fact, that our own manufactures were only successfully carried on in the immediate neighbourhood of coal fields? So far from making foreign nations tributary to us by this tax on coals, we would drive them to those supplies of cheap fuel which were within their own reach. For what were we going to incur all this risk? For a revenue of £40,000, from which must be subtracted the additional cost to be incurred in collecting it.—Mr. HUME followed, arguing against the proposed tax on grounds similar to those which had been urged by Lord HOWICK.—The CHANCELLOR of the EXCHEQUER gave some explanation as to the alleged compromise with the coalowners, which he distinctly disclaimed.

Mr. LUDWELL vindicated Mr. Hall, and the other North of England Members, sitting for the coalowners, in the measure which they had adopted, in acquiescing in the amended proposition of the Government. He confessed, in the first place, that the number of colliers who worked with a view to the export trade, the amount of capital embarked in machinery for them, and the large number of population engaged in the trade, he regarded the general proposal of the Government with the greatest anxiety. He therefore trusted that the Government would carefully watch the operation of the duty, so that if it should be found that a moral case had never recovered, should such a result take place, the Government would have something to answer for; and he trusted that they then would not hesitate to acknowledge that they had acted erroneously.

Mr. GRANTING admitted that the great and only argument in favour of the proposed tax was the revenue to be derived from it, and which he contended was to be drawn from an unobtainable source as could be pointed out. He read a letter, with the object of showing that coal was exported to foreign countries at lower rates than they were sold to the home consumer; and that, therefore, the trade was not likely to be so seriously affected by the tax as had been argued. In fact, there were certain markets for our coals, such as that of Denmark, where even the original proposition of the Government, of 1s., would not at all have affected our trade, while those that would be affected by the present duty of 2s., would only be so to a comparatively small amount.—Mr. LAMBORN opposed even the modified proposition of the Government, on the ground of the injury likely to accrue from it. Our export trade in coals was a new and rising one with the foreigner.

Lord Malmoe said, that it is extensive a series of changes as the tariff increased it was not to be expected that all come would be free from doubt but if there were any article beyond every other respecting which there could be no possible uncertainty, he should say that that article was the coal duty. In support of the view which he took of this subject, he desired to call the attention of the House to that which formed rather a remarkable feature in the circumstances connected with the proposed duty—he regarded it as one of the most extraordinary coincidences that ever occurred with reference to a imposition of the nature. It was well worthy of especial notice that the calculations of the men of science should have gone to support and strengthen the decision of the statesmen without its having been possible for them to hold any communication on the subject. While his right hon. friend at the head of her Majesty's Government was mastering the tariff now before the House, Dr. Buckland, the President of the Geological Society, delivered an extraordinary address to the body of which he was the head. That address was read on the 19th February in the present year, and in the course of his remarks the learned president said that British coals were used for the purposes of working the machinery of foreign manufactures, which in certain cases could scarcely be maintained without a supply of British coals. In the year 1830, 1,431,000 tons were exported, and in 1840, 1,375,000 tons, of which nearly one-fourth was sent to France. Dr. Buckland further observed, that an increased duty on coals exported to any country occupying our own coasts might afford a remedy. Besides the testimony of Dr. Buckland in support of the proposition of her Majesty's Government, some valuable evidence as to the probable supply of coal in the northern districts was given before a committee of the House, which sat in 1838. In that evidence were stated the number and extent of all the principal coal-fields. It set forth, that there in Northumberland and Durham are twelve, and from those data has been calculated that the coal in those counties will last ten years. Moreover, in his *Survey of Durham*, which was published in 1840, the coal being already got, the coal districts will be exhausted in 200 years. It is probable that most beds of inferior coal, which are now consumed, may be fitly be rejected, and the consumption of coal being greatly increased since Mr. Sturges published his *Survey of Durham*, we may admit his calculation to be an approximation to the truth, and that the coal of Northumberland and Durham will be exhausted in a period not greatly exceeding 100 years. This opinion would be the high authority of Mr. Buckland. Another eminent geologist was asked this question (May 18 1851)—“What do you think of the policy of permitting the exportation of coals to foreign parts from Northumberland and his answer was—“It is permitting foreigners to convert the fields of our own poverty.” As Mr. Sturges has observed, that the supply of coal was calculated to last 1700 years. That was the estimate of Mr. Thompson, but other testimony contradicted his to be contradicted by Dr. Buckland, Mr. Dalry, and by Mr. Buckland. The com-

plaint of Dr. Beckford against the waste of coal committed by the owners was well known. That learned person wrote in these terms:—“The wanton waste which for more than fifty years has been committed by the coal-owners near Newcastle, by screening and burning annually in never-extinguished fiery heaps at the pit's mouth more than 1,000,000 chaldrons of excellent small coal, being nearly one-third of the entire produce of the best coal mines in England—this criminal destruction of the elements of our national industry, which is accelerated by one-third, the not very distant period when these mines will be exhausted, is perpetrated by the colliers for the purpose of selling the remaining two-thirds at a greater profit than they would derive from the sale of the entire bulk unscreened to the coal merchant.” To preserve in such a course was to destroy the vitals of our posterity. For the reasons, then, that he had stated, and upon the evidence which he had laid before the House, he would most cordially give his support to the proposition of her Majesty's Government.

Mr H. PERL rejected that the income tax was secured, for this night's debate had shown what sort of chance he would have had for raising a revenue of four millions on articles of consumption. The present proposal was pretty generally supported by the coal trade, but that was asserted to be through a compromise. No little, however, had he himself been aware of any such arrangement, that even so lately as on Saturday last, when he attended a meeting on this subject at the Board of Trade, he supposed himself perfectly free as to his own line, and knew not what course Mr. Bell, on the part of the coalowners, intended to take. But he could readily conceive that the coalowners, seeing the Government generally successful upon the other items of the tariff, would be very likely to come to the result they had arrived at, without anything like a compromise or bargain with the Government. Even if there had actually been a compromise, he could not think that such an arrangement, fairly made for the public, would have been open to blame. If that were inadmissible, to what purpose was it that the Board of Trade received deputations, and that the senses of parties interested in all branches of trade was communicated to Government? Now, as to the merits of this tax. Here was an article incapable of reproduction, and eminently abundant in England. Revenue being wanted, such an article was surely a fit one for an export duty. There had been a steady progressive increase in its exportation, for it was peculiarly suited for foreign manufacturers, and for the lighting of towns by gas. But then it was said that foreign states would be indignant at a duty raising prices upon their subjects. Why those states all raised a duty upon this very article themselves, as shown by the following

IMPORT DUTY ON COALS INTO		a. d.
France—Mediterranean ports and to Oleron—French vessels		3 6
" " Foreign		4 3
From Oleron to Dunkirk—French vessels		4 0
" " Foreign		5 0
Holland		6 10
Belgium—From France		2 9
" Other countries		11 8
United States		6 8
Brazil		8 0
Denmark		3 0
Sweden		2 0
Prussia		3 0
Hamburg	1½ per cent. ad valorem	
Russia		Free

Naturally the foreigner was not entitled to have our commodity, and to get a revenue upon it, and to exclude us from taking any revenue upon it for ourselves. He trusted that, under all the circumstances of the Eschequer and the country, the House would sanction the proposal of the Government.

Lord J. RUSSELL, considering that this tax was proposed solely on grounds of revenue, and not from any anti-commercial motive, would vote for it. There was, doubtless, some risk in the experiment, but he did not apprehend such injury to the trade as to lead him to refuse the Government the revenue they wanted. It had been said that this duty would be an injury to France; but France had an easy mode of redressing herself by taking off the import duties. There were many other countries besides France to take our coal and use it for the various purposes of steam power in towns. They must consider, likewise, that the seams of coal on the continent were so far removed from any export, that although they excluded English coal from the manufactories in their neighbourhood, they could not well compete with us in coal to be sent to places by sea. For these reasons, therefore, he was not prepared to give his vote against the proposition of the Government, and he trusted the trade would not be seriously injured thereby.

Mr. C. BULLMAN differed in opinion from Lord J. Russell. He thought that it was an unwise policy to peril a great trade and large property for the paltry sum of about £30,000 of revenue.—On a division there appeared—For the Government proposition, 306; against 13, 67.

After some conversation on the expediency of allowing a drawback on coal exported for use in inland steam vessels, and on some other points, the committee reported that the committee on the steam tax were agreed to the continuation of the present rate, and that the committee on the coal and the coal trade had recommended an additional 5 per cent. of duty having been agreed to, the long labour of the tariff was finished. Sir R. Peel expressing a hope, that as all the duties had been fully discussed, and as he intended that generally they should come into immediate operation, there would be no delay in passing the bill to be brought in.

THE SMOKE NUISANCE—MR. C. W. WILLIAMS'S SYSTEM.

A discussion at the Rural Victoria Gallery, Melbourne, on Wednesday week, was devoted to the subject of the "Bunkie" movement, and the following communication was made by C. Wye Williams, Esq., on the "Bunkie" movement:—

"Mr. W. FROSTMAN in the chair, who, in opening the proceedings, said, the subject under consideration was one of the greatest interest to this town—an association having been formed, the labours of which would soon commence, to endeavour to save the autonomy, if not to prevent it altogether.—Mr. C. W. WILLIAMS then examined the model of a series of three distinct houses built with a common base through which a main water supply ran, and which were connected by a common main, and a common sewer line. Each house contained a little water, in which was placed a thermometer. No. 1 was provided with a barrel full of condenser pipe, but Nos. 2 and 3 were plain houses. He referred to this to show that the quantity of fuel used might have no relation to the quantity of steam generated. If the fire were urged all the water in the boiler No. 1 began to boil, and if the thermometer rose to the maximum—500, full of oil degrees—if it merely gained the fire from one end of the boiler, the thermometer would not rise. The water in the boiler No. 2 would be heated from one end only, and not from the other. Years would pass, and the thermometer of the

the same—but it would not be so; there would be a very great distinction of the reparative effort, because the No. 1 boiler was a better absorber of heat than the other two; and, as he increased the heat, he gave it more to do, so that they must consider the fuel used as bearing almost any relation to the quantity of steam generated, as increasing the furnace produced a total change of effect. He then said his paper, in which, after some general allusions to the public meetings in Leeds and Manchester on the subject of the smoke nuisance, he stated that the Leeds meeting had unexpectantly failed in effecting the result which its promoters anticipated. It was expected that some tangible and effective measures would have resulted from an independent body, and that such measures would have been desired as would have assisted the existing, and the largest, and the most successful of all the existing public bodies in the abatement of the smoke nuisance, and would have been generally admitted and desired. Such measures would at least have afforded some basis to guide the committee, and enable the great mass of "sinners and sinners," as they were justly termed at the late meeting, to see their way out of the labyrinth of arguments by which they had been so long bewildered. The Leeds meeting began at the wrong end, by drawing together the numerous claimants of the public law—calling on them to perform their functions in a manifestly incompetent trial, and almost leaving such to perjuryise himself and his plans, instead of appointing a small working committee, who would, in a certain extent, have relieved the subject from the present state of obscurity and complication. So far, however,

in respect from the present state of obscurity and complication. So far, however, from desiring the field of uncertainty, manufacturers now find the difficulties of a more positive knowledge of the law to be a relief than a burden.

What the public would expect, and be sure, on the authority of the same statement, this collection of forty or fifty plans, in which they find it impossible to separate the wheat from the chaff, but to have had the aid of a judicious and impartial committee to assist them in making a selection. His proposed choosing some of those points to which the attention of the committee might safely be directed—viz., the ascertaining to what extent the prevention of the entrance of duties might be profitable—to what class of firms and farmers improved principles of cultivation might be applied—what would be the saved means of proceeding towards meeting points to ascertain, if and whereby provided, such measures as to what extent might be applied to the improvement of the agricultural system, and to what extent it would be advisable to adopt, and how far it would be just to exempt the system of consular measures, until such were specifically determined and printed out.

But the most valuable fruit of such a committee would be its raising some persons, who had no leisure for furtherance experiment, or who were interrupted by duties on the culture of their resources, by adding them to their search after what was best. Such an undertaking might bear the description of the several in its nature, and then much useful information would be obtained and recorded, and in a business would be formed to which the great body of manufacturers would look with confidence, and to which they would be able to refer when they sought for the answers which they would be most likely to find, and also to be assured of the common feeling, large and so much a philanthropic desire to assist the progress of a sturdy industry, but a sturdy conservatism of the advantages to be derived by such attention—thus the realized trial to the ear of the manufacturer would be the promise of benevolence in the measures they propose. The benevolence

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death by the chimney? Was it increased or diminished? Was the draught increased or greatly equal? Was there a greater or lesser concentration of heat in the furnace, or was it more uniformly distributed along the grate? What was the nature of your accounting these several facts, beyond the mere appearance of the chimney top? Does your plan require any, and what, adjustment in the admission of air, by valve or otherwise? Does the fire require any particular mode of management, or is it a simple question of fuel and draft, which could readily be framed, which would insure the merits of the several plans. In the event of a choice, would it be a saving?—What saving will be effected? Yet the amount of saving to be realized, you

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incorporated. Suppose, however, that the flame from the furnace, instead of being carried up the chimney, as it is in the ordinary arrangement, or for other cause, it was only able to take up one-half that additional heat—say 25 per cent.—in such case the remaining twenty-five per cent. would necessarily be lost by escaping through the chimney. Should we then be justified in estimating the economy of the new process of the furnaces by such measure of increased steam? and would it be safe or correct to estimate it at a gain of but 25 per cent., without also estimating the other 35 per cent. which was lost, and which, under a better arrangement, or a better boiler, might have also turned to the account of evaporation? After making a few remarks on forcing the fire, and reading some extracts from Treadgold, which suggested that his opinion was that smoke was the worst enemy of the boiler, and that he had considered the effect of the smoke on the boiler, and in six feet from coal and three feet from smoke, he said, to use Mr. Williams's own words—"What would he have said, had he witnessed Mr. Parker's late experiments on a marine boiler, in which the flame reached to forty feet, and in which the fire could not be detected? What would he have said, if I showed him, as I daily see, a flame of twenty to twenty-five feet from a furnace supplied with coke alone, and never under ten feet in length? How are we to account for this, but by assuming first, that he had not witnessed the proper combustion of the gases, which form the products flame, and that he had not adopted the means of looking into the furnace. That, if he had done so, he would have been witness within the furnace, as Mr. Parker observes that he could not find a ray of smoke in the furnace of the old system. Mr. Armstrong, following Treadgold, says in his Treatise, "we have never seen the flame go beyond the bottom of the boiler." I will show him the flame all round the boiler, as well as along the bottom, and I will do more—I will show him a flame of ten to twelve feet long from the bridge at the very moment, and under the exact state of things when he alleges that there is no flame at all; and that the admission of cold air behind the bridge, instead of actually producing the same, as it does, in fact, would so chill down the bottom of the boiler as to cause

plates to contract, or drag the rivets into holes. This is alleged by him to have occurred in Blannett's boiler, which he never saw in action, as there was no opportunity for internal inspection. If it were so, how did it happen that the rivets and seams were also dragged all over the boiler, and even to the corner of the boiler? The importance of coloring the boiler and its heat-absorbing faculty, then, is fully recognized in a Cornish boiler. By this means, and by a system of internal sanding, a large absorbing surface is obtained, and the boiler is made to "burn" the fuel it is fed with in equal times, for, after all, on this question of *time* the whole economy is twofold, as to the fuel used and the time employed. The more active the combustion the greater will be the ratio of heat arising from the escaping and unemployed heat; first, because the absorbing surface of the boilers are unable to take up all such additional heat in equal times; and, secondly, because the current draught of the gaseous matter, carrying such heat through the flues, is also increased. If, then, in any given boiler, we require the largest quantity of water in the shortest time, we must have a good pound of coal, and without reference to *time*, we must have rendered in either the boiler or the furnace a large amount of heat. Combustion produces more heat from the pound of fuel, but because it happens sooner, on with the nature of the absorbing faculty which the boiler plates possess, we find this question of *time* is overlooked in practice, though quite as essential in drawing an inference as the question of fuel used. A more perfect combustion can only be profitably brought into action and rendered available by two means—viz., by extending the absorbing surface, or by increasing its heat absorbing and transmitting quality. It would, then, require experiments, that, in calculating the quantity of combustion in the furnace by the weight of water evaporated, without taking into account the nature of the fuel, the power, and considering that quantity as equivalent to an increased evaporative power, would be a calculation would be deceptive in every sense. The following are the circum-

estimation would be deceptive in every case. The following are the circumstances liable to interfere with the efficient action of both furnace and boiler:—

*Causes Influencing the Quantity of Heat Generated.*—1. The state of the atmosphere, as to its pressure. 2. The burning into holes, or unequally, and not steadily, as to its rate of heat. 3. Irregular size of the fuel, large and small, 3 to 4 per cent. 4. Inattention to securing the chimneys, as to draught. 5. Variations in the draught and use of the damper. 6. Quantity of air admitted, and moisture in solution. *Causes Influencing the Quantity of Steam Generated.*—1. State of the fire—clean, or covered with soot. 2. Shape and size of the flues. 3. Extent of, or heat absorbing surface. 4. Quantity of escaping heat—that is, the rate of current. 5. Temperature of this escaping heated matter by chimney. 6. Temperature in the flues. Again, what are the terms and circumstances which should enter into our calculation in estimating the value or effect of any system, or any particular boiler? They are—1. The weight of fuel employed. 2. The time taken for its combustion. 3. The quantity of heat generated. 4. The quantity of such heat absorbed by the water. 5. The quantity lost and escaping by the chimney—that is, the current. 6. The temperature of the escaping products. 7. The weight of water

Mr. Williams having completed his paper, proceeded to exhibit a colored diagram, exhibiting a boiler and the fire beneath it for only half its length, the rest of space being filled with black smoke. By the addition of a strip of parchment, showed the changed appearance produced, as in his experimental furnace in coal street—namely, a bright clear flame, or rather white heated matter, extending throughout the whole furnace, as seen by means of eight holes, formed of iron tubes, inserted in the end of the furnace, or flue, at the opposite extremity to the door. The case of the marine boiler experiments by Mr. Parkes, at times as much as by feet of the flue were filled with flame, and twelve feet of flame was the minimum. The flame from coke alone was never less than two feet long, and it became very hot when the fire was urged. He next explained a table, exhibiting the results of a series of minute and careful experiments, made by Mr. Josiah Parkes, a marine engineer at Liverpool, during the past week. The table exhibited the results of burning as much as 100 lbs. on a furnace with quick combustion, on the one hand, and on the grate with the grate fire, on the other, and the results of burning as much as 100 lbs. on the grate with the grate fire, on the one hand, and on the furnace with the furnace fire, on the other. The surface of the grate was seven and a half feet in length, the flue was five feet in length, with 500 feet of surface. In the experiment No. 1, 150 lbs. of coal were burned in one hour, and 400 lbs. of water evaporated, or concentrated, into steam, being equal to 2 lbs. 8 oz. of water per pound of coal. The mean heat of the

being exposed to a 20 ft. of water per pound of coal. The mean head of the sea was 100', and the head ranging 100'. The cost of evaporating 100 cubic feet of water, taking the coal at 10c. per ton, was 5c. 4c. On that day the whole of the water which there was no probability of seeing a single ray of light the whole of the night. The experiment was made with great care and with the day. The second experiment was made on the 10th of the month, and the water was evaporated every thing like the sea come as in the first and second, and the water was evaporated the air on the surface through the perforated box, and with the same water experiment No. 2. 100 lbs. of coal were uniformly consumed in case 10c., instead of 10c., evaporating 12 1/2 lbs. of water, which was equal to 7 lbs. 10c. of water per pound of coal used; the mean temperature of the sea was 100', and 100' evaporated, and was washed—so that a much larger body of head went away than in the first experiment. In order to adapt the plan of slow combustion, a quantity of fuel was put on, upon the plan recommended by Mr. Parkes, and 100 lbs. of coal were consumed in the same, yet the quantity of water evaporated was raised from 12 1/2 to 12 1/2 lbs. In the third experiment, the water was evaporated the slowest the combustion in the more head and the water was evaporated per pound of coal—namely, in this instance, 20 lbs. 10c. The mean head of the sea was 100', and the head ranging 100'. But the question of time head of the sea. Exactly as is provided to use slow combustion in a large boiler, apparently consumed the fuel, but did not get through the same amount of fuel in the time, and thus the engine did not do its duty—whereas a head of a stronger vessel and—Give me this plan of slow combustion, the cost of evaporating 100 cubic feet of water, the coal at 10c. the ton, is only 5c. 4c., instead of 10c. 5c. 4c. The cost of the water is 10c. 5c. 4c. The cost of the water is 10c. 5c. 4c. This plan, if you will, is satisfied with this quality of the water, and the cost on the quantity of steam wanted per pound of coal, and not on the quantity of steam evaporated with a certain quantity of fuel. This experiment had been

one is represented while a certain quantity of heat. This experiment had been previously conducted, and the heat been treated to make it equal to 2 lbs. 10 oz. of water evaporated per unit of time, at an extent of 100 degrees, and the amount of heat in the same ratio. This, in its entirety, was then made in which the amount of heat should be tested, and not only for the quantity of heat given out in place of steam.—Mr. Williams then applied the process to an Argand lamp, in which the water moved about downwards, indicating a considerable rise in temperature. As it gradually cooled, the water returned, and Mr. Williams observed that the water in it produced a considerable effect in constructing the boiler, as indicated by the change of the water. By means of the process, the water of the Argand lamp, until the state of his flow. If the process could not be used, he would not know whether his process was in action. If it would do so, he would have been something wrong—that his law was in error, and that the process was in action. This was the case, in which Professor Mott and Phillips, Messrs. P. Clark, Perry, Washington, Clark, Thompson, Jordan, the Gas Company, and Mr. W. Clark, and the other members of the committee, were present for the meeting for the meeting, as well as for the meeting of the committee on this subject, which he had said, before the public, and, George, &c., in the public of Birmingham.



## PROCEEDINGS OF PUBLIC COMPANIES.

## COLOMBIAN MINING ASSOCIATION.

The annual general meeting of the proprietors of this company was held on Thursday, the 15th inst., at the offices of the company, Australia.

G. D. POWERS, Esq., in the chair.

The advertisement convening the meeting having been read, the CHAIRMAN submitted the directors' report, as follows:—

## REPORT.

The directors have now to lay before the proprietors a report of the proceedings of the company during the past year. They have to regret that it will not be so complete as they would desire, owing to the great interruption which has occurred in the internal communications of New Granada, arising from the insurrection which broke out in that country in the latter part of 1845. From January, 1846, to February, 1847, the River Magdalena, the main channel of communication between the coast and the interior, was closed by the insurgent party, and all intercourse with the capital, except by very circuitous routes, suspended. On the 24th of February last, however, a complete pacification was effected on the coast, and the ordinary channels of communication will, doubtless, be immediately resumed.

**COPIA DISTRICT.**—It was stated in the last report that the prospects in this district seemed to be improving, and to afford a hope that the operations of 1846 might have a profit. This expectation has, to some extent, been realized, so far as the returns have been received. The balance against the Sogila Mines in the balance-sheet of last year was £4067. 18s. 4d.; in the present it is £601. 11s. 6d.—showing an improvement therein of £3465. 7s. 4d.; but the series of accounts is incomplete, from the cause already stated. The directors are unable to state the exact quantity of gold produced in 1846, the returns for September and December not having been received; they believe it will be found to be about 420 lbs. of fine gold. The produce of 1846 was 273 lbs. of £108. 21s. 6d. Mr. Degenhardt estimated that he should be able to raise about 150,000 tons of clean ore in 1847. It seems probable that he will be about 150 tons short of this quantity, which he attributes mainly to the want of hands, occasioned at times by the political movements in the interior.

**PANAMA DISTRICT.**—Since the last report, owing to the continued disturbances of the country, the ore prepared for export, amounting to about fifty-four tons, calculated to produce in this country £6840. Five of all charges, has been detained in its transit to the coast, but now that advice has been received that the political disturbances have been adjusted, this ore, so long detained, may be expected soon to reach this country. It will be seen by the balance-sheet that the balance against this establishment has been increased by about £4000, but it has, of course, to be deducted for the ore now coming forward. A contract for working this mine has been entered into with Mr. Jones, the superintendent, and Captain Patton, and Mr. Wallis, to commence from the 1st of October last, for the term of four years, on the following conditions, viz.—They are to receive 24 per cent. of the value of the gross produce of the returns of the establishment, as realised in Bogotá or elsewhere, and 15 per cent. on the amount of the net profits. This agreement is subject to be annulled by the board whenever they think proper; and it is distinctly understood that the directors are to be exempt from all expenses which cannot be covered by the produce of the mines, and not to be responsible for any amount of cost which may be incurred over and above the realised value of produce, unless such excess of expenditure shall be expressly authorised by them or their agents in Bogotá.

It would have been very gratifying to the directors if they could have announced that, which they are aware can now alone give satisfaction to the proprietors—the declaration of a dividend from the produce of the mines. It is not in their power to do so. Some profit has been made in the past year, and the concern is so far in a better position than it was at the last annual meeting, but the amount of profit must be on a larger scale to be sensibly felt by the proprietors. The superintendent at the Sogila District, Mr. Degenhardt, is full of confidence in the capabilities and the resources which he sees around him. He has not made good his estimate of profit for the past year within about 15 per cent. In so far as this has been occasioned by the want of hands, arising from the political disturbances, and the political disturbances, Mr. Degenhardt cannot be responsible for the deficiency. But it has too often been experienced in this and other like undertakings, that, when success might reasonably have been looked for, some interruption or hindrance has arisen from some quarter or other where it was not expected. With respect to political disturbances in the country, the directors are bound to own that the least interruption has ever been given to the company's operations thereby, except such as has arisen indirectly from the nature of these disturbances—the resulting for troops occasioning the natives to desert their ordinary occupations, and the communications being, in some parts, interrupted, but the company's property, and the Europeans in its service, have always been respected by all parties. If it had happened that Mr. Degenhardt had realised a larger produce at his district of 15 per cent., it would, undoubtedly, have been sensibly felt, as the increase would have been attended with little proportionate expense. The object of reducing the loss sustained at Marmato, in the extraction of the precious metals from the ore, has been followed up most assiduously. Various experiments and methods have been tried, and are still in progress, with this view. The directors hope that something has been effected in this way, and they trust still more will be done, it being clear that, if it were by any means practicable to extract the whole, or nearly the whole, of the precious metals, the Sogila District would, for some time past, have been yielding a considerable profit. An opportunity having occurred for Mr. Chapman, the secretary of the company, paying a visit to New Granada, without expense to the company, the directors have readily availed themselves of it, in order that Mr. Chapman might visit the company's two establishments there. He left England in April last for this purpose, and the directors expect that he will be able to visit the Panama establishment in the present month of June.

The accounts submitted showed the total expenditure, since the commencement of the company, had been above £60,000, of which amount £47,041 had been expended upon the mines in Colombia, and £12,958 upon the Panama mines. The reserve fund, invested in the 3 per Cent. Consols, amounts to £3760. The total amount raised by shares amounts to £48,500, and by loan £1200.

The CHAIRMAN said, the next business was the election of directors, and, as Mr. Wilkins did not wish to be re-elected, the directors proposed that the number should be reduced from seven to five.—It was then moved, seconded, and carried unanimously.—That Mr. McDonald and Mr. Alderman Thompson be re-elected directors, and Messrs. Donaldson and Kewbank auditors, for the ensuing year.—The CHAIRMAN stated, that the Deed of Settlement originally required that there should be not less than twelve directors, which number was afterwards reduced to seven. It was now proposed that the number should be reduced to five—three to be a quorum.—A motion to that effect was accordingly carried unanimously, but another meeting will be required to confirm the same.

Some conversation ensued respecting the future prospects of the company, which appeared much better than for some time past. The company had now let out the mines in Panama, which used to swallow up the profits made in Sogila.—In reply to a proprietor, a DIRECTOR observed, that, in the monthly gold returns, from 25 lbs. to 28 lbs. of fine gold might be set down as the average expenditure, and all above that amount would be profit; the value of the pound of fine gold was here about £67, or about about £243.—After some further conversation the meeting adjourned.

## WEST WHEAL JEWEL MINING ASSOCIATION.

At a special general meeting of the proprietors of the above company, held at the offices, 23, Threadneedle-street, on Wednesday, the 15th inst.,

J. HERON, Esq., in the chair.

It was moved by Mr. MOUNT, seconded by Mr. TRENNERY, and carried unanimously.—That the resolution passed at the special general meeting, held on the 20th ult., for increasing the capital of the association to the extent of £1. per share upon the existing number of 2643 shares, be hereby confirmed.—The meeting then adjourned.

## MINING CORRESPONDENCE.

## ENGLISH MINES.

## HOLMSTON MINING COMPANY.

June 13.—I beg leave to inform you that the lode in the 110 fathom level west is still about eight inches wide, with stones of ore. The lode in the 100 fathom level west is two inches wide, and worth 71 per fathom; in this level east we are driving south to intersect another part of the lode; the lode in the eastern stipes, in the back of this level, is eighteen inches wide, and worth 331 per fathom; the lode in the western stipes, in the back of ditto, is eighteen inches wide, and worth 431 per fathom. In the new y fathom level west the lode is still about eighteen inches wide, and worth 351 per fathom; the lode in the eastern stipes, in the back of this level, is eighteen inches wide, and worth 331 per fathom; the lode in the middle stipes, in the back of this level, is eighteen inches wide, and worth 301 per fathom; the lode in the western stipes, in the back of ditto, is sixteen inches wide, and worth 261 per fathom. The lode in the eighty fathom level east is one foot wide, and intersected with ore; the ground-out at this level to the north lode is still progressing in favourable ground; the lode in the stipes, in the back of this level, is fourteen inches wide, and worth 231 per fathom. The sixty-two fathom level east is without alteration; the sixty-two fathom level west is suspended, and the back cut on tribute at 4s. in the 11. The tribute pitches, upon the whole, are still looking favourable.

F. PHILLIPS.

## TRENNERY MINING COMPANY.

June 13.—We are progressing favourably with the sinking of Baker's shaft, which is now down six fathoms below the forty fathom level; we have carried but little of the lode in sinking latterly, consequently I cannot at present inform you of what it is chiefly composed. We have commenced sinking a new mine below the forty fathom level, about twenty fathoms to the east of Baker's shaft, where the lode is of a very favourable description, producing grey ore, and worth about 151 per fathom. We have succeeded in cutting the eastern lode in the cross-cut going south, at the forty fathom level, which is about two feet wide, chiefly composed of spear, peach, and muscovite, with spots of yellow ore, which I consider to be a highly lode. We have commenced driving east on its course; the ground is favourable. The south part of the Mine-park lode, on which we are now driving, at the forty fathom level going east, is unproductive.

J. NIXON.

## TRENNERY MINING COMPANY.

June 11.—At Clifton shaft an lode has been taken down. The seventy-west is two feet wide, nearly all muscovite, with a quantity of water issuing from it. At the seventy-east an ground has been driven. The sixty-west is considered by a slide. The sixty-east is worth 35 per fathom. The fifty-west is worth 75 per fathom; and the mine under is worth 151 per fathom. Good Fortune shaft is down below the twenty about six fathoms. Good Fortune shaft is worth 61 per fathom in sinking. The forty-four east is worth 61 per fathom, but in the thirty-four there is not much ore. The tribute pitches throughout are looking very well.

W. STANLEY.

## TRENNERY MINING COMPANY.

June 12.—The lode in the forty fathom level, east of engine-shaft, is eight inches wide, and producing some ore. The lode in Williams's shaft, sinking under the thirty fathom level, is six inches wide—tribute ground. The lode in the thirty fathom level, east of Hexwood's shaft, is six inches wide—unproductive. Treppell's lode, at the thirty fathom level, east of John's shaft, is eight inches wide, producing some ore. The north part of the Mine-park lode, east of John's shaft, at the twenty fathom level, is one foot wide—unproductive. John's lode, east of John's shaft, at the ten fathom level, is four inches wide—tribute ground. The Mine-park lode, at the shaft, east of Morcom's shaft, is one foot wide—unproductive.

H. WILLIAMS. J. MORCOM.

## UNITED HILLS MINING COMPANY.

June 14.—Williams's Shaft.—No lode broken in this shaft for the past week. Sixty Fathom Level.—In the eastern end of this level the lode is four feet wide, and improved for ore since last reported; in the western end the lode is five feet wide, producing some stones of ore. Fifty Fathom Level, east of Eastern Shaft.—The lode is eighteen inches wide, one foot producing ore; at the stipes, back of ditto, the lode is two feet wide, and very good for ore; east of James's shaft the lode is two and a half feet wide, eighteen inches on the south part producing some good ore. Diagonal and Eastern Shafts.—In the eastern shaft the lode is three feet wide, one foot on the north part good for ore. Thirty Fathom Level.—The lode in this end is one foot wide, occasionally producing good stones of ore; in the west the lode is one foot wide, at present with but little ore. Twenty Fathom Level.—In this mine the lode is small, and producing a small quantity of ore.

N. LANGDON.

## WEST WHEAL JEWEL MINING ASSOCIATION.

June 13.—The seventy-east on the south branch is more promising in its appearance for ore. At the seventy-east, on Wheel Jewel lode, the lode is fifteen inches wide, principally yellow ore, worth 151 per fathom. The fifty-seven-east on this lode is worth 151 per fathom; and in the mine, under this level, the lode is worth 151 per fathom. The fifty-seven-east on Buckingham's is more promising; and in the cross-cut, driving south on the little cross-course, we expect we are near the lode on the other side.

S. LEAN.

## TAMAR SILVER-LEAD MINING COMPANY.

June 13.—In the 125 fathom level the lode is about one foot wide, producing a small quantity of ore. In the 115 fathom level the lode is just the same width, good saving work. In the 105 fathom level the lode is from nine inches to one foot wide, composed of capel, fluor-spar, and silver-lead ore. In the ninety-five and we appear to be nearly through the stony ground; the lode is again forming itself, but as yet poor. In the eighty-five fathom level the lode is one foot in width, carrying a good leader of ore. In the sixty-five fathom level the lode is small and poor. The fifty-five fathom level is still in stony ground; and in the forty-five fathom level the lode is three feet wide, producing good work, and promising. In the thirty-five fathom level the lode is eighteen inches in width, producing a little ore. At the north mine the work is all in a forward state.

J. SPRAGUE.

## FOREIGN MINES.

## IMPERIAL BRAZILIAN MINING ASSOCIATION.

Gold Report.—Gold raised from the 5th of March to the 24th (seventeen days), 20 lbs. 5 oz. 4 drs. 10 grs.—Total, from the 1st of January to the 24th of March, 153 lbs. 1 oz. 4 drs. 10 grs.

## BRAZILIAN COMPANY.

Cata Branca, March 15.—The various works go steadily forward, and I think this week will complete matters enough to enable the new pumping-wheel, by means of a chain, to assist the old engine, and keep the bottom clear of water. You will see that the gold return shows a little improvement. Indeed, badly, apparently, as this year has commenced, it already exhibits some gain over the last to the same period. I am sorry to say that we are just beginning to feel the ill effects which always, to a greater or less extent, accompany the change of seasons here. An influenza attacked us yesterday, and the number on the sick list to-day is eighty. There are as yet no serious cases, and our surgeons do not anticipate more than temporary inconvenience from it.

W. COTTEWORTH.

March 25.—Captain Cotterworth left for Conceicao on the 20th instant. In consequence of not being able to keep the water in fork in the mine, the stamps have fallen very short of stuff this week. However, to-morrow I trust, see the new pumping-engine at work, and the evil thus remedied. The sick list is, I am happy to say, reduced.

March 30.—I informed you in my last of my anticipation of the new pumping engine going to work on the 26th instant. In this, however, I have been disappointed, in consequence of an unforeseen difficulty, which will occupy us yet two days. The small quantity of ore sent out of the mine, owing to the causes formerly mentioned, added to the holidays, will cause the gold return for this week to be very low.

W. T. GRIFFITHS.

Gold return for three weeks to 25th March, 52 lbs. 1 oz. 1 dr. 12 grs.

## ST. JOHN DEL REY MINING COMPANY.

March 25.—Average number of heads working eighteen days, 57.83. Mines.—Sinking continued in the Babu and Gamba, Champion being lengthened west. The old level in this mine, alluded to in our last, has been cleared out; it was driven seven feet. Monthly cost for February, 14,061 rs. 912. Water.—Yesterday the Babu was at low-water mark. It has rained hard all day, the Babu is in flood, and there are 6 ft. 6 in. water tanked. The Minghan is full. Arrastre.—The sand ground will be amalgamated to-morrow, and its contents included in the returns for March. Surface Works.—Mason's party employed on dam. Another leader is being prepared to lay down here, one not being sufficient to carry the waters off during freshets.

## COLOMBIAN MINING ASSOCIATION.

Marmato, Feb. 17.—Mellito Level South.—It is pleasing to know that this level has intersected, in the direction pointed out by Mr. William Degenhardt, the deposit of ore as stated in the current section of this lode made by Mr. Walker. There are now some hundreds of tons of ore at command in this station, which may be broken and extracted, say, for £2 per ton; and, judging from the favourable result obtained by washing a sample of the ore now on the surface, it will contain about 14 oz. fine gold per ton, if assayed. This lode will, for the present, appear under the name of South Gamba.

Gambu Cross-cut South.—We have also been so fortunate as to intersect the North Salto in the company's boundary with this cross-cut yesterday; and although the lode is found small at this point of intersection, there are 2000 tons of ore at immediate command from this lode in the back of this cross-cut, according to Mr. W. Degenhardt's calculation, and which I believe is to the point. Mellito north level, extended on the Gambu north lode, has a lode of enormous width in its present end; but the ore is rather soft and porous—a circumstance which has also been pointed out at an early time by Mr. Walker, and which proves to be correct. There are the most favourable and important alterations that have taken place during the last few days in the mine; the remainder of the stations are continuing as usual, and most favourably, on the Conde lode, which at present is almost entirely procured only in the Camba region.

March 3.—Prospects of this Establishment.—In my letter of the 7th January, 1846, I stated that an exertion of mine should be wanting in reference to the various property to the company, and to enjoy the shareholders with a regular dividend, which they deeply deserved, for their faithful support of this establishment. Two years have elapsed since that time, and nothing material has been effected towards this most of all desirable objects, owing to causes which were out of my control, although great obstacles have nevertheless been compared, and many more are yet required to be surmounted in the erection of stamps, acquisition, opening out the different mines, and, above all, in procuring sufficient active labourers, for a reasonably low wages. I have now the pleasure of confirming my former statements, and the shareholders may safely expect a satisfactory dividend from the beginning of next year—at least, such is warranted by the prospects of the mine in its several stations, which are merely required to be carried on vigorously and economically. During February, only 617 tons of rough ore have been stamped, owing to the insufficiency of stamps and the dry season, the water having fallen off very considerably; it is expected they will produce 30 lbs. fine gold.

## MINE REPORT FOR JANUARY.

Summary of Ore.—During January, 120 1/2 tons of ore have been concentrated on the different lodes, and produced 720 lbs. of ore.

North Salto Fourth Rise.—The communication with this and the old level, seven and a half fathoms above the San José cross-cut, is made. The air now is good, and the party ordered to drive the North Salto and further west, and after driving three feet, we met again with a promising branch of ore, which now has improved to four feet clean ore, and is free for breaking. At present there are in operation three sinks on the North Salto, in an horizon with the San José cut. The first and the third are to the east of the cross-cut, the second to the west of it; in all of them are promising bunches of ore. The distance from the first to the third is eight fathoms, and from the first to the second twelve fathoms—making a total distance of twenty fathoms. The first sink is already fourteen fathoms deep, and the ore in it averaging thirty-six inches; by sinking this sink six feet deeper we shall reach the horizon of the North Gambu cross-cut south, which cross-cut I expect will cut in a few days the North Salto main lode. The height from this cross-cut to the North Salto level amounts to fifteen fathoms, the distance from the three sinks to twenty fathoms—making 300 square fathoms of ground, which 300 square fathoms will produce at least four tons of ore on an average, making a total amount of 1200 tons; and the lode east of the third sink, and west of the second sink, is equally good.

Gambu Extension Level, Bottom Stage.—The ore is good, but the air very bad; free for breaking, and nearly five feet wide. After a ventilation is effected, we may obtain from this quarter a great quantity of ore.

Mellito South Level.—The lode is cut with this level, and appears of a good nature; I think we shall effect the communication soon with the old workings, a little above, as previously stated. The Cruzada deep sill cross-cut north is recommenced; the ground, although harder, will, I think, improve soon.

[To be concluded in our next.]

## WORK PERFORMED BY STEAM-ENGINES.

IN MAY, 1845.

Taken from the official duty paper of Mr. THOMAS LEAN, of Marazion, Cornwall: 2 stands for single; 4 for double; in. for inches.

Mines.	Engines.	Stroke in cyls.	No. of revs. per min.	Weight of steam per hour.	Weight of water per hour.	Pounds lifted 1 foot high by a bushel of coal.	Average quantity of water p. min.
W. Darlington	Eastern 30 in. s	Foot.	12.1	2.67	11.00	81,001,201	1m. gal.
Ditto	Halse's 30 in. s	10.0	13.24	3.14	12.74	45,417,774	1073.00
Gr. W. Fortune	G. W. Fort. 30 in. s	—	—	—	—	—	—
Ditto	Wh. Pm. 30 in. s	9.7	10.5	—	—	—	—
Ditto	Wh. Friends. 70 s	10.0	14.04	8.95	40.00	41,337,882	743.00
Providence	30 in. s	8.0	14.80	8.0	33.00	30,135,138	100.5
Wheal Virgin	Taylor's 30 in. s	10.0	13.1	8.37	30.10	50,355,145	333.00
Ditto	Vincent's 30 in. s	9.0	4.0	8.50	30.00	28,135,073	—
Reliance	30 in. s	9.0	6.0	—	—	—	—
Carlisle Cons.	70 in. s	9.0	15.00	8.4	—	—	—
Wheal Julia	30 in. s	—	—	—	—	—	—
Ding-dong	30 in. s	6.0	17.5	3.8	33.4	33,276,000	74.4
Levant	New 30 in. s	9.0	11.1	3.0	30.00	30,337,750	50.8
Botallack	30 in. s	8.0	10.5	8.1	37.0	33,395,117	101.1
Balldown	24 in. s	7.0	13.5	8.3	30.00	31,027,454	63.8
Godolphin	30 in. s	10.0	11.19	7.8	33.00	70,008,133	1063.00
Ditto	Roberts's 30 in. s	10.0	10.5	8.30	10.00	73,500,303	—
Great Work	W. Breage 30 in. s	9.0	8.5	3.33	77.4	38,083,047	380.10
Ditto	Loed's 30 in. s	9.0	14.00	7.00	14.00	65,410,000	—
Wheal Vor	30 in. s	10.0	10.0	8.2	33.00	78,733,816	—
Ditto	Trelawny's 30 in. s	10.0	10.0	8.2	33.00	78,733,816	—
Ditto	Woolf's 30 in. s	9.0	10.0	8.2	33.00	78,733,816	—
Ditto	Penhale 30 in. s	9.0	10.0	8.2	33.00	78,733,816	—
Trevarna	40 in. s	9.0	10.0	7.70	34.00	54,937,384	470.00
Dunstanville	30 in. s	—	—	—	—	—	—
South Breage	W. Chancelor 30 in. s	9.0	8.7	4.8	11.38	35,134,400	114.4
North Breage	New eng. 70 in. s	10.0	13.4	3.7	10.00	67,610,600	375.8
S. W. Croft	Trevelyan 30 in. s	10.0	11.1	4.0	12.00	77,303,000	900.4
Ditto	30 in. s	9.0	10.0	8.2	—	—	—
Dunstanville	70 in. s	9.0	10.0	8.2	33.00	78,733,816	—
Wheal Vor	30 in. s	9.0	10.0	8.2	33.00	78,733,816	—
Polkiss	30 in. s	10.0	11.4	8.4	34.00	45,495,310	324.00
W. U. Wood	Williams's 30 in. s	—	—	—	—	—	—
Hallaton	Vine's 70 in. s	10.0	7.14	7.4	13.54	36,008,110	1001.0
Ditto	30 in. s	10.0	11.4	7.0	30.41	48,471,703	—
W. Beachamp	Western 30 in. s	7.75	—	—	—	—	—
Ditto	Powering's 30 in. s	9.0	10.5	7.4	13.00	35,030,010	315.0
Wheal Urey	70 in. s	10.0	10.7	6.8	87.35	44,388,737	347.4
Carn Breage	70 in. s	10.0	10.7	6.8	87.35	44,388,737	347.4
Ditto	30 in. s	8.0	10.0	8.2	33.00	78,733,816	—
Timcroft	30 in. s	9.0	13.50	4.0	10.00	34,041,417	300.4
East Pool	30 in. s	9.75	9.4	4.75	9.04	35,573,378	315.0
S. W. Beach	40 in. s	9.0	13.5	4.0	9.37	35,078,473	135.0
United Mines	Taylor's 30 in. s	11.0	11.03	6.0	17.00	57,105,700	—
Ditto	Carlson's 30 in. s	9.0	13.74	8.75	30.00	30,818,247	—
Ditto	Edson's 30 in. s	9.0	10.5	8.3	30.7	30,480,700	—
Ditto	Edson's 30 in. s	10.0	10.5	8.3	30.74	30,811,623	—
Ditto	Hocking's 30 in. s	10.0	10.4	8.3	33.00	78,733,816	—
Boscor Bridge	30 in. s	10.0	10.5	8.3	—	—	—
S. W. Trevarna	70 in. s	10.0	8.7	8.3	24.00	38,365,704	181.0
United Hills	Williams's 30 in. s	10.0	9.10	8.3	10.00	76,610,010	—
Ditto	Old, 30 in. s	9.0	6.00	5.4	4.41	35,000,334	451.0
Polkiss	30 in. s	10.0	10.5	8.3	11.00	44,140,040	470.4
Ditto	Vigne's 30 in. s	9.0	10.7	6.8	10.00	35,000,334	—
E. Wheal Rose	30 in. s	9.0	10.5	7.8	10.00	41,721,334	308.4



